PUBLIC-PRIVATE PARTNERSHIPS: INNOVATIVE CONTRACTING

(110–24)

HEARING

BEFORE THE

SUBCOMMITTEE ON
HIGHWAYS AND TRANSIT

OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

APRIL 17, 2007

Printed for the use of the
Committee on Transportation and Infrastructure

PUBLIC-PRIVATE PARTNERSHIPS: INNOVATIVE CONTRACTING

PUBLIC-PRIVATE PARTNERSHIPS: INNOVATIVE CONTRACTING

PUBLIC-PRIVATE PARTNERSHIPS: INNOVATIVE CONTRACTING

PUBLIC-PRIVATE PARTNERSHIPS: INNOVATIVE CONTRACTING

PUBLIC-PRIVATE PARTNERSHIPS: INNOVATIVE CONTRACTING

PUBLIC-PRIVATE PARTNERSHIPS: INNOVATIVE CONTRACTING

PUBLIC-PRIVATE PARTNERSHIPS: INNOVATIVE CONTRACTING

(110–24)

HEARING

BEFORE THE

SUBCOMMITTEE ON
HIGHWAYS AND TRANSIT

OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

APRIL 17, 2007

Printed for the use of the
Committee on Transportation and Infrastructure

U.S. GOVERNMENT PRINTING OFFICE

34–795 PDF WASHINGTON : 2007

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

JAMES L. OBERSTAR, Minnesota, *Chairman*

NICK J. RAHALL, II, West Virginia
PETER A. DEFAZIO, Oregon
JERRY F. COSTELLO, Illinois
ELEANOR HOLMES NORTON, District of Columbia
JERROLD NADLER, New York
CORRINE BROWN, Florida
BOB FILNER, California
EDDIE BERNICE JOHNSON, Texas
GENE TAYLOR, Mississippi
JUANITA MILLENDER-McDONALD, California
ELIJAH E. CUMMINGS, Maryland
ELLEN O. TAUSCHER, California
LEONARD L. BOSWELL, Iowa
TIM HOLDEN, Pennsylvania
BRIAN BAIRD, Washington
RICK LARSEN, Washington
MICHAEL E. CAPUANO, Massachusetts
JULIA CARSON, Indiana
TIMOTHY H. BISHOP, New York
MICHAEL H. MICHAUD, Maine
BRIAN HIGGINS, New York
RUSS CARNAHAN, Missouri
JOHN T. SALAZAR, Colorado
GRACE F. NAPOLITANO, California
DANIEL LIPINSKI, Illinois
DORIS O. MATSUI, California
NICK LAMPSON, Texas
ZACHARY T. SPACE, Ohio
MAZIE K. HIRONO, Hawaii
BRUCE L. BRALEY, Iowa
JASON ALTMIRE, Pennsylvania
TIMOTHY J. WALZ, Minnesota
HEATH SHULER, North Carolina
MICHAEL A. ACURI, New York
HARRY E. MITCHELL, Arizona
CHRISTOPHER P. CARNEY, Pennsylvania
JOHN J. HALL, New York
STEVE KAGEN, Wisconsin
STEVE COHEN, Tennessee
JERRY MCNERNEY, California

JOHN L. MICA, Florida
DON YOUNG, Alaska
THOMAS E. PETRI, Wisconsin
HOWARD COBLE, North Carolina
JOHN J. DUNCAN, JR., Tennessee
WAYNE T. GILCHREST, Maryland
VERNON J. EHLERS, Michigan
STEVEN C. LATOURETTE, Ohio
RICHARD H. BAKER, Louisiana
FRANK A. LOBIONDO, New Jersey
JERRY MORAN, Kansas
GARY G. MILLER, California
ROBIN HAYES, North Carolina
HENRY E. BROWN, JR., South Carolina
TIMOTHY V. JOHNSON, Illinois
TODD RUSSELL PLATTS, Pennsylvania
SAM GRAVES, Missouri
BILL SHUSTER, Pennsylvania
JOHN BOOZMAN, Arkansas
SHELLEY MOORE CAPITO, West Virginia
JIM GERLACH, Pennsylvania
MARIO DIAZ-BALART, Florida
CHARLES W. DENT, Pennsylvania
TED POE, Texas
DAVID G. REICHERT, Washington
CONNIE MACK, Florida
JOHN R. 'RANDY' KUHL, JR., New York
LYNN A WESTMORELAND, Georgia
CHARLES W. BOUSTANY, JR., Louisiana
JEAN SCHMIDT, Ohio
CANDICE S. MILLER, Michigan
THELMA D. DRAKE, Virginia
MARY FALLIN, Oklahoma
VERN BUCHANAN, Florida

SUBCOMMITTEE ON HIGHWAYS, TRANSIT AND PIPELINES

PETER A. DEFAZIO, Oregon

NICK J. RAHALL II, West Virginia
JERROLD NADLER, New York
JUANITA MILLENDER-McDONALD, California
ELLEN O. TAUSCHER, California
TIM HOLDEN, Pennsylvania
MICHAEL E. CAPUANO, Massachusetts
JULIA CARSON, Indiana
TIMOTHY H. BISHOP, New York
MICHAEL H. MICHAUD, Maine
BRIAN HIGGINS, New York
GRACE F. NAPOLITANO, California
MAZIE K. HIRONO, Hawaii
JASON ALTMIRE, Pennsylvania
TIMOTHY J. WALZ, Minnesota
HEATH SHULER, North Carolina
MICHAEL A ARCURI, New York
CHRISTOPHER P. CARNEY, Pennsylvania
JERRY MCNERNEY, California
BOB FILNER, California
ELIJAH E. CUMMINGS, Maryland
BRIAN BAIRD, Washington
DANIEL LIPINSKI, Illinois
DORIS O. MATSUI, California
STEVE COHEN, Tennessee
ZACHARY T. SPACE, Ohio
BRUCE L. BRALEY, Iowa
HARRY E. MITCHELL, Arizona
JAMES L. OBERSTAR, Minnesota
(Ex Officio)

JOHN J. DUNCAN, JR., Tennessee
DON YOUNG, Alaska
THOMAS E. PETRI, Wisconsin
HOWARD COBLE, North Carolina
RICHARD H. BAKER, Louisiana
GARY G. MILLER, California
ROBIN HAYES, North Carolina
HENRY E. BROWN, JR., South Carolina
TIMOTHY V. JOHNSON, Illinois
TODD RUSSELL PLATTS, Pennsylvania
JOHN BOOZMAN, Arkansas
SHELLEY MOORE CAPITO, West Virginia
JIM GERLACH, Pennsylvania
MARIO DIAZ-BALART, Florida
CHARLES W. DENT, Pennsylvania
TED POE, Texas
DAVID G. REICHERT, Washington
CHARLES W. BOUSTANY, JR., Louisiana
JEAN SCHMIDT, Ohio
CANDICE S. MILLER, Michigan
THELMA D. DRAKE, Virginia
MARY FALLIN, Oklahoma
VERN BUCHANAN, Florida
JOHN L. MICA, Florida
(Ex Officio)

CONTENTS

U.S. House of Representatives
Committee on Transportation and Infrastructure
Washington, DC 20515

James L. Oberstar
Chairman

David Heymsfeld, Chief of Staff
Ward W. McCarragher, Chief Counsel

John L. Mica
Ranking Republican Member

James W. Coon II, Republican Chief of Staff

April 12, 2007

SUMMARY OF SUBJECT MATTER

TO: Members of the Subcommittee on Highways and Transit

FROM: Subcommittee on Highways and Transit Staff

SUBJECT: Hearing on Public-Private Partnerships: Innovative Contracting

PURPOSE OF HEARING

The Subcommittee on Highways and Transit is scheduled to meet on Tuesday, April 17, 2007, at 10:00 a.m. to receive testimony on innovative contracting and procurement techniques under public-private partnership (PPP) arrangements. The Subcommittee will hear from officials of the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), the Utah Department of Transportation, TriMet (a transit agency in Oregon), as well as representatives of the engineering and construction industries and a transportation employee union.

BACKGROUND

Nature of Public-Private Partnerships

The Government Accountability Office defines a public-private partnership, in part, as "a contractual agreement formed between public and private sector partners, which allows more private sector participation than is traditional. The agreements usually involve a government agency contracting with a private company to design, renovate, construct, operate, maintain, and/or manage a facility or system. While the public sector usually retains ownership in the facility or system, the private party will be given additional decision rights in determining how the project or task will be completed." The U.S. Department of Transportation has adopted this definition for its programs. The goal of PPPs is to allocate responsibilities in the development, construction, and management

of a transportation project to the public and private partners that will produce the best result and to share equitably the risks and rewards among the partners.

Conventional Contracting Approach

Traditionally, delivery of highway and transit projects follows the design-bid-build sequence. Under conventional contracting practices that began in the mid-20th century, public transportation agencies (state departments of transportation and transit authorities) use in-house engineering staff to design a transportation project until it is 100 percent complete. The project is then let out for construction bids in a competitive process. Generally, the private construction firm that offers the lowest-price bid is awarded the contract to build the project. The project is financed with public (federal, state, or local) funds. Upon completion, the public transportation agency inspects the project to ensure that it is built according to plan and meets various design and construction standards. The agency then operates and maintains the project during the useful life of the project. The advantages of conventional contracting for the public agency are (1) complete control over project design, (2) a competitive bid price for project construction, and (3) a high degree of transparency. The disadvantages are (1) financial exposure to change orders, (2) no guarantee of the lowest final project cost, and (3) a need for complete public funding.

Innovative Procurement Models of PPPs

For a variety of reasons, in the mid-1980s, both state departments of transportation (state DOTs) and transit agencies began outsourcing to private contractors a number of the activities associated with planning and development of transportation projects. Over time, the list of such outsourced activities lengthened.

As the number of transportation PPPs grew, these arrangements were presented as a win-win proposition for governments and the private sector. For the government, PPPs offered the opportunity to encourage entrepreneurial development and operation of transportation projects, take advantage of private-sector management skills and capital, speed up project delivery and the application of advanced technology, and reduce the size of public payrolls. For the private sector, PPPs offered opportunities to participate in infrastructure investment, to expand a firm's customer base, and to diversify its business model.

A number of innovative contracting models evolved, encompassing varying activities for which the private-sector partner was responsible. They ranged from design-build to design-build-operate, design-build-maintain, and design-build-operate-maintain. As more responsibilities were assumed by the private-sector partner, more of the risks relating to project costs and delays were shifted to the private-sector partner.

FHWA Special Experimental Project No. 14

To evaluate innovative contracting methods by state DOTs that have the potential of reducing the life-cycle cost of projects while maintaining product quality, FHWA established the Special Experimental Project Number 14—Innovative Contracting (SEP-14) program in 1990. SEP-14's contracting techniques deviate from the competitive bidding requirements of the federal highway programs. Normally, projects carried out using these techniques would not be eligible for federal assistance. Using administrative flexibility under its research, development, and technology

transfer authority, FHWA was able to provide state DOTs federal assistance for projects selected to participate in SEP-14. SEP-14 focused on four innovative contracting methods that could potentially reduce the life-cycle cost of projects, including cost-plus-time bidding, lane rental, warranty clauses, and design-build contracting.

- **Cost-plus-time bidding**, commonly referred to as **A+B bidding**, brings time into bid determinations. For award consideration, the bid is a combination of the price for the contract items and an associated cost of the construction time. The lowest "cost" bid would win the contract, considering all relevant factors. The combined cost of contract items and time is used to determine the lowest bid for awarding the contract; it is not used to determine the contract amount. This is an effective tool to reduce impacts of projects that have the potential to significantly delay users during construction.

- Under a **lane rental** arrangement, a rental fee based on the estimated cost of delay or inconvenience to road users during the rental period is included in the contract. The fee is assessed for the time the contractor occupies or obstructs part of the roadway, and is deducted from the monthly progress payments. The contract is awarded to the low bid for the contract items. This method is particularly useful for major projects in urban areas that could significantly affect the traveling public.

In May 1995, FHWA declared A+B bidding and lane rental arrangements operational, and no longer considered them experimental.

- **Warranties** are used to protect investments from early failure. They have been used successfully by states on non-federal projects. FHWA policy has long restricted the use of warranties on federal projects because such contract requirements may indirectly result in federal assistance being used for routine maintenance. FHWA issued its final rule concerning warranty clause in April 1996. This rule limited warranties to specific features of, and products used for, projects on the National Highway System, and prohibited their use for routine maintenance.

- When a transportation agency uses the **design-build contracting** method for a project, it specifies the end result conditions of, and design criteria for, the project. Contractors bidding for the project then develop design proposals that optimize their individual construction capabilities. By allowing the contractor to optimize its work force, equipment, and scheduling, the design-build approach creates opportunities for innovation. By accepting the greater flexibility under design-build, the contractor also accepts greater responsibility for the performance of the project. Warranties and extended liability insurance are often used to ensure such performance. Since both design and construction are carried out under one procurement contract, project delivery can be expedited because construction can begin before all design details are finalized. Moreover, claims for design errors or construction delays due to design errors are disallowed.

With scores of projects having been carried out under SEP-14, FHWA considered the experiment a success, and cost-plus-time bidding, lane rental agreements, and warranties have been accepted as mainstream practices, and all four non-traditional techniques are used as accepted experimental methods.

In the Transportation Equity Act for the 21st Century (TEA 21), Congress decided to add design-build to the federal-aid highway program as an acceptable contracting method. TEA 21 permitted state DOTs to award a design-build contract for a project approved by the Secretary of Transportation provided that the final design had not begun before the project had met its National Environmental Policy Act (NEPA) requirements. TEA 21 also limited this contracting method to ITS projects over $5 million or any other highway projects over $50 million.

The Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) eliminated the $50 million floor for the size of eligible highway projects and required the Secretary to issue revised regulations to allow transportation agencies to proceed with certain actions prior to receipt of final NEPA approval.

FHWA permits federal assistance for projects using design-build contracts when such projects are approved under SEP-14 and the contracts are awarded using competitive bidding procedures.

Controversies surrounding the use of design-build and warranties remain. Smaller construction firms have claimed that they cannot compete successfully against large firms because they do not have the requisite in-house capabilities to offer a design-build package or that they have difficulty acquiring surety bonding for warranties.

FHWA Special Experimental Project No. 15

In 2004, FHWA established Special Experimental Project Number 15 (SEP-15) program to explore four major areas where alternative approaches may expedite project delivery. These areas of interest include contracting, right-of-way acquisition, project finance, and compliance with environmental requirements.

SEP-15 is not a replacement program for SEP-14, which continues to be used to evaluate experimental contract administration methods. Instead, it targets a different set of contract oversight issues with the aim of speeding up project delivery. SEP-15 can be used for a specific project or several projects that may or may not be physically adjacent to one another.

As under SEP-14, SEP-15 permits the use on non-traditional project delivery techniques on federal-aid highway projects that are otherwise prohibited by law or FHWA regulation or policy. A primary objective of SEP-15 is to identify current laws, regulations, and practices that inhibit the greater use of PPPs and private investment in transportation improvements, and to develop administrative procedures and recommend statutory changes to overcome such impediments.

In essence, SEP-15 encourages state DOTs, other governmental entities, private entities, and PPPs to identify elements of project development—including requests for proposals, unsolicited proposals, proposal evaluation, project planning and design, finance plans, right-of-way acquisition, environmental review, regulatory compliance, and others—that could be expedited through waivers of existing law, FHWA regulation, or practice (called an experimental feature).

A state DOT wishing to participate in SEP-15 submits an application, which includes a description of the laws, FHWA regulations, policies, and practices from which the state DOT is

seeking waivers, and an explanation of why such waivers would be beneficial to the development of the project. The application is reviewed by FHWA. If the application is approved, FHWA and the state DOT jointly develop an agreement (called an early development agreement) that specifies how the waivers are to be implemented. Other governmental entities, private entities, and PPPs initiating projects may also seek waivers under SEP-15, but the applications must be channeled through state DOTs.

To date, applications for seven projects in Texas, Oregon, and Virginia have been approved. Among these projects, early development agreements have been finalized between FHWA and Texas and Oregon DOTs for four of the projects.

FTA Design-Build Project Delivery

Design-Build and Design-Build-Operate-Maintain (DB/DBOM) project delivery methods were first explicitly authorized for Federal transit capital projects by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). ISTEA established a demonstration program for what were then called "turnkey system projects". The turnkey system authority, originally codified at 49 U.S.C. 5326, allowed a transit agency to contract with a private company or consortium to construct and operate a public transit system under specific performance criteria. FTA was directed to select two or more New Starts projects to determine if DB/DBOM could save time, reduce cost, and introduce new technologies. The demonstration projects include the Baltimore Light Rail Transit (LRT) System Extensions, San Juan Tren Urbano, Bay Area Rapid Transit District San Francisco International Airport Extension, and Northern New Jersey Hudson Bergen LRT line. These projects were selected because they represent various technologies, levels of investment, engineering complexity, financial arrangements, and management structures. Results are documented in a report to Congress titled "Turnkey Experience in American Public Transit" dated October 1998.

TEA 21 made minor modifications to FTA's turnkey system authority, clarifying that a turnkey system project could include designing, building, operating, or maintaining a transit system or operable segment of a transit system. Over time, the term "design-build" became more widely used by the transportation industry to describe these contracting practices. This evolution in the terminology is evidenced by the use of the terms "design-build" and "design-build-operate-maintain" in FTA's September 2000 guidance that describes the process a grant recipient may follow when pursuing a full funding grant agreement for a New Starts project using design-build project delivery methods. Since TEA 21, several design-build projects have been completed, including Los Angeles Union Station Intermodal Terminal, Las Vegas Monorail, Portland Airport MAX, Denver Southeast Corridor (T-Rex), Minneapolis-St. Paul Hiawatha LRT, and New Jersey Transit River Line.

In SAFETEA-LU, the term "turnkey system projects" was repealed and the more common term "design-build" was applied, and the statutory language was moved to the Contract Requirements section of the transit law (49 U.S.C. 5325(d)). SAFETEA-LU also codified the eligibility of the use of design-build contracting techniques to any capital project financed through FTA programs, subject to compliance with all applicable federal requirements.

Currently, several DB/DBOM projects are in various phases of the planning process, including but not limited to the following: Portland South LRT (in Final Design), Houston North Corridor BRT (in PE), Houston Southeast Corridor BRT (in PE), St. Paul-Minneapolis Central

Corridor LRT (in PE), Washington, DC Dulles Corridor Metrorail Extension (in PE), San Francisco BART-Oakland connector (in AA), and Honolulu LRT (in AA).

FTA Public-Private Partnership Pilot Program

Section 3011(c) of SAFETEA-LU authorizes the Secretary of Transportation to establish and implement a pilot program to demonstrate the advantages and disadvantages of public-private partnerships for certain new "fixed guideway capital projects", as defined by 49 U.S.C. 5302(a)(1) and (4). In the conference report to SAFETEA-LU, the conferees described the intent of the program as "seeking to identify cost drivers for critical, complex, and capital intensive transit New Starts projects." The focus was studying the PPPs where significant savings could be realized through qualification-based selection and performance-based contracting that integrate risk sharing, streamline project development, engineering, and construction, and preserve the integrity of the NEPA process.

Under the terms and conditions of the Pilot Program, the Secretary may select up to three projects to participate in the Pilot Program from fiscal year 2006 through fiscal year 2009. A project is eligible to participate if it has not entered into a full funding grant agreement or project construction grant agreement with FTA; has a set schedule and finance plan for the construction and operation of the project; and has conducted an analysis of the costs, benefits and efficiencies of the proposed public-private partnership agreement.

The Secretary may approve the application of a project to participate in the Pilot Program if the Secretary determines that: (i) applicable State and local laws permit public-private agreements for all phases of development, construction, and operation of the project; (ii) the recipient is unable to advance the Project due to fiscal constraints; and (iii) the plan implementing the public-private partnership is justified.

FTA will designate as Pilot Projects those projects that exhibit high "demonstration value." In determining the extent to which a project exhibits demonstration value, FTA will consider, among other things: (i) the number of project elements for which the private partner is responsible, (ii) the quality of risk allocation with respect to the cost and ridership of the project, as set forth in the public-private agreement, (iii) the extent to which equity capital and development proceeds are contributed to the project and the terms on which such capital is contributed, (iv) whether the project is part of a congestion mitigation plan that incorporates system-wide congestion pricing, and (v) the expected effects of the foregoing arrangements on the speed of delivery of the project, the quality of delivery and performance of the project, and the reliability of the projections of costs and benefits associated with the project.

Pilot Projects that are candidates for funding under FTA's New Starts program will be evaluated and rated in accordance with the rating scheme of the New Starts program, as adjusted to account for their "demonstration value". Accordingly, Pilot Projects that receive an overall rating of medium or higher and a cost-effectiveness rating of medium or higher, as adjusted for their demonstration value, will be included in the President's Budget to Congress for New Starts funding. Pilot Projects that propose to use non-New Starts Federal funds may receive certain benefits, such as regulatory relief, as negotiated with FTA on a case-by-case basis, after taking into account the demonstration value of the project. FTA expects to utilize an opening in the Pilot Program for a project receiving non-New Starts Federal funds only if the project presents exceptionally high

demonstration value. Currently, five project sponsors have expressed an interest in applying for the Pilot Program.

PREVIOUS SUBCOMMITTEE ACTION

The Subcommittee on Highways and Transit has held two hearings on PPPs, the first one in May 2006 and more recently in February 2007. The focus of the first hearing was on long-term leases of existing highways in the United States and how such concessions are structured. In response to a growing interest in PPPs among the states and a strong push by FHWA for PPP adoption by the states, the hearing held earlier this year explored the public interests at stake and how those public interests could be protected in PPP arrangements.

WITNESSES

PANEL I

Mr. James Ray
Acting Deputy Administrator
Federal Highway Administration
Washington, D.C.

Mr. David B. Horner
Chief Counsel
Federal Transit Administration
Washington, D.C.

The Honorable John Njord
Director
Utah Department of Transportation
Salt Lake City, Utah

Mr. Fred Hansen
General Manager
TriMet
Portland, OR

PANEL II

Mr. Paul Yarossi, P.E.
Office of the Chairman
Executive Vice President and President
HNTB Holdings Ltd
New York, NY

Mr. Richard Thomas
Director of Government Affairs
Ames Construction, Inc
Burnsville, MN

Ms. Maria Lehman, P.E., F.ASCE
Chief Operating Officer
Chazen Companies
Poughkeepsie, NY

Mr. Bruce Blanning, P.E.
Executive Director
Professional Engineers in California Government
Sacramento, CA

PUBLIC-PRIVATE PARTNERSHIPS: INNOVATIVE CONTRACTING

Tuesday, April 17, 2007

HOUSE OF REPRESENTATIVES,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
SUBCOMMITTEE ON HIGHWAYS AND TRANSIT
Washington, DC.

The subcommittee met, pursuant to call, at 10:00 a.m., in Room 2167, Rayburn House Office Building, the Honorable Peter A. DeFazio [chairman of the subcommittee] presiding.

Mr. DEFAZIO. I would like to call the Highways and Transit Subcommittee to order.

Today we are going to do another in our ongoing series of hearings about private-public partnerships. The attempt of the Committee is to better understand the breadth, the depth, the potential and the pitfalls of private-public partnerships. Clearly, not all private-public partnerships are alike. We want to understand better how they can be used by jurisdictions around the Country.

We particularly want to look at the Federal Highway Administration's new special experimental project called SEP-15, and also review some of the previous project, SEP-14, and what at least one witness will say is a very mixed outcome from that, although others would say that conventionally, it's an unqualified success.

So with that, I would turn to the Ranking Member for any opening comments he might have.

Mr. DUNCAN. Well, thank you, Mr. Chairman. I'm pleased that we're holding this hearing today on innovative contracting techniques.

For over 20 years, State departments of transportation and local public transit authorities have been using innovative contracting techniques to help complete highway and transit projects in the most efficient way possible. By involving the private sector at various stages of the project delivery process, Government agencies are able to take advantage of private sector management skills, and in some cases, private sector capital, to complete projects on time and on budget. The goal of these innovative contracting techniques is to allocate responsibilities in the design, development, construction and management of a project to the different private and public partners in a way that will produce the best results.

One of the key advantages to these types of contracts is that the private sector shoulders more of the risks associated with a project than in the traditional contracting process. Design-build contracting is an innovative contracting method that has become very common in highway and transit projects in recent years. Under

this method, the transportation agency specifies the design criteria for a project and contractors that bid for the project then develop design proposals that optimize their individual construction capabilities.

The design-build, operate and maintain contracting method is a technique that is getting a lot of attention now in the transit world. In a project executed under this method, the private sector is involved not only in designing and building the project, but also in operating and maintaining the project for several years after the project is put in service.

These innovative methods are not without their critics. We need to make sure that smaller contractors and design firms are not adversely affected by these types of contracts. And we need to ensure that the public transportation agencies that are administering these projects are able to provide the proper level of oversight on each project.

Also, I personally hope that some of this design work and other types of work, are not given out to companies from other countries, but are given to American companies and American workers.

Thank you, Mr. Chairman, for holding this hearing, and I yield back the balance of my time.

Mr. DEFAZIO. I thank the gentleman.

If there are no other opening statements, we will go right to the witnesses. First will be Mr. James Ray, Acting Deputy Administrator, Federal Highways Administration. Mr. Ray.

TESTIMONY OF JAMES D. RAY, CHIEF COUNSEL AND ACTING DEPUTY ADMINISTRATOR, FEDERAL HIGHWAY ADMINISTRATION; DAVID B. HORNER, CHIEF COUNSEL, FEDERAL TRANSIT ADMINISTRATION; THE HONORABLE JOHN R. NJORD, P.E., DIRECTOR, UTAH DEPARTMENT OF TRANSPORTATION; FRED HANSEN, GENERAL MANAGER, TRIMET, PORTLAND, OREGON

Mr. RAY. Chairman DeFazio, Ranking Member Duncan and members of the Subcommittee, thank you for the opportunity to testify today on the topic of innovative contracting and public-private partnerships. I ask that my full statement be made part of the record for this hearing.

Secretary Mary Peters has said, “Congestion is endangering our freedom, our economy and our independence.” With this alarming fact in mind, the Department of Transportation initiated its national strategy to reduce congestion to address this threat to our national well-being. We must find better, faster and more innovative ways to contract for needed transportation improvements. We must remove barriers to private sector participation in the construction and operation of transportation infrastructure.

More flexible contracting is necessary to make this happen. That is why innovative contracting mechanisms pursued by FHWA are so critical.

In traditional Federal aid highway construction contracting, cost is generally the one criterion that determines the winning bid. In recent years, State highway agencies have struggled to meet customer needs. Factors other than cost have emerged as important considerations in awarding highway construction contracts. States

now take into account quality, delivery time, safety, road user impacts, life cycle costs and better use of improved technologies.

Unfortunately, traditional procurement approaches will not be sufficient to address our current transportation needs or reverse the alarming trends developing across our system. Innovative contracting techniques provide States the flexibility to address these issues and encourage contractors to be more creative in addressing States' needs.

More flexible procurement arrangements are often a key part of public-private partnerships. While discussion of P3s is focused on private financing thus far, public-private partnerships can be defined more broadly and include alternative contracting methods that increase private sector involvement. By employing innovative contracting techniques, the private sector can optimize its use of design, construction and materials and thereby increase the quality and timeliness of the final product.

FHWA has made it possible for both States and the private sector to explore the use of innovative contracting techniques. FHWA developed SEP-14 to provide States with a vehicle to explore new concepts in construction contracting. Under SEP-14, States are allowed to test innovative contracting techniques within FHWA oversight. Techniques evaluated under SEP-14 include design-build, cost plus time bidding, lane rental and warranty clauses, all of which have become accepted practice. These contracting methods not only result in time and cost efficiencies for traditional highway projects, but also facilitate greater private sector involvement in project delivery.

Design-build contracting is one of the most significant innovations resulting from SEP-14. For the State, the use of design-build can result in cost savings, price certainty and time savings. From the private sector's perspective, design-build gives the contractor greater flexibility to meet the project's purpose by utilizing a variety of methods and materials.

Building on the success of SEP-14, FHWA established SEP-15 to increase project management flexibility, encourage innovation and improve timely delivery of project construction. Like SEP-14, SEP-15 allows States to apply for conditional approval to test innovative approaches to the project delivery process.

FHWA has long encouraged increased private sector participation in Federal aid projects, and SEP-15 allows FHWA to actively explore changes in the way we approach the delivery of highway projects. Our Nation faces challenges at the Federal, State and local levels in addressing our mobility needs. Innovative contracting is one method by which transportation agencies can address these needs in a cost-efficient and timely way.

The State, the private sector and road users can all benefit from the increased use of innovative techniques.

Mr. Chairman, members, thank you for the opportunity to testify today, and I would be pleased to answer any questions you might have.

Mr. DEFAZIO. Thank you, Mr. Ray.

Mr. Horner, Chief Counsel, Federal Transit Administration.

Mr. HORNER. Chairman DeFazio, Ranking Member Duncan and members of the Subcommittee, thank you for the opportunity to testify about innovative contracting and public transportation.

How we build and operate our transit infrastructure is a matter of increasing importance to the Nation's transportation system. Whether transit projects are built on time, on budget and realize the benefits expected from them affects the public support for new projects and more broadly, its view of the Federal transit program. Innovative contracting practices can harness incentives and penalties that are lacking in traditional procurement to assure that taxpayer-funded projects meet public expectations.

Commonly referred to as public-private partnerships, innovative contracts are relatively recent in the world of public transportation investments. But there is little doubt that their ruse will grow over time as public agencies and elected officials seek to reduce large operating deficits and achieve better rates of on-time project delivery.

In January of this year, pursuant to directives in SAFETEA-LU, FTA established its public-private partnership pilot program. Through the pilot program, FTA has invited project sponsors to experiment with alternative system procurement in order to identify more effective ways of building new transit capacity for the American public. I am pleased to report that FTA recently received four applications to the program. Those applications are for major projects sponsored by the San Francisco Bay Area Rapid Transit District, or BART, Houston Metro, Denver RTD, and the Georgia Regional Transportation Authority.

The questions are often asked, where is the opportunity in P3s for public transportation and how do transit P3s work when transit facilities realize significant operating deficits. Because substantially all transit infrastructure is currently operated on a cash flow negative basis, the financial opportunity for transit is not the proverbial cash on the barrelhead, but instead the avoidance of costs and opportunity known as subsidy minimization.

To explain the concept of subsidy minimization, we can think of it this way. In the case of a transaction for an existing highway, a cash flow positive asset, the public agency asked the private sector, how large a concession payment will you pay me? In the case of a transaction for new transit capacity, a cash flow negative asset, the public agency asks the private sector a different question: how small a subsidy will I pay you?

Private operators then compete for the opportunity to provide service, not by bidding up the concession payment, but by bidding down the subsidy. The financial return to the private entity is the difference between its costs to deliver and operate the system, on the one hand, and the system's total revenues, including public subsidy, on the other. The public agency then pays the subsidy to the private operator in the form of availability payments over a term of years, so long as the system is built and operated according to performance requirements approved by the public agency.

This model has been used widely in the United Kingdom with great success since 1992, when that country responded to the challenges of project procurement that we in the United States are struggling with today. Under a program instituted by the Labor government called the Private Finance Initiative, or PFI, the U.K.

treasury requires and has required for the past 15 years that public agencies evaluate using P3s to procure social infrastructure before relying on conventional government contracting.

In total, PFI has accounted for 10 to 14 percent of all investment in public services in the U.K. and has delivered at least 451 projects. The results of PFI have been impressive, whereas only 30 percent of conventional non-PFI projects have been delivered on time and only 27 percent delivered within budget. Over 88 percent of the PFI projects have been delivered on time. To the extent the same PFI projects have incurred cost overruns, none has been borne by the public sector.

It is perhaps no surprise, therefore, that Standard and Poors recently found in a survey of public officials and private procurement officials that 91 percent of respondents agreed P3s have a better track record of project delivery than conventional public sector procurements. As we approach reauthorization, we should study the results of the PPP model in the U.K. to understand why innovative contracting has achieved such improvements over conventional improvements.

Thanks to the SAFETEA-LU pilot program, we may expect to have data from the U.S. for U.S. projects to inform our thinking as well.

Thank you again for the opportunity to speak with you this morning. I'd be happy to answer any questions you may have.

Mr. DEFAZIO. Thank you, Mr. Horner.

Now we will got to the Honorable John Njord, Utah Department of Transportation.

Mr. NJORD. Thank you, Chairman DeFazio, members of the Committee. It's a pleasure for me to be here today and to talk about some innovative contracting methods that we've been using in the State of Utah and how it has influenced our ability to deliver projects.

Ten years ago, the Utah Department of Transportation launched into the first design-build transportation mega-project in this Country's history. That has been 10 years ago, and since that time we have seen design-build spread across this entire Country. The project that I am referring to that began all this was the I-15 reconstruction in Salt Lake County, a $1.59 billion reconstruction project.

Now, some of you that may have never been to my great State of Utah may have never seen this facility. But if you will think of the Springfield interchange, which is not too far by this building here, multiply that by three, add eight urban interchanges, seventeen miles of freeway, that is the I-15 reconstruction project, a very large, complex project that began in 1997. This facility was on the most congested portion of our interstate in the State of Utah. It was in the most difficult location to build. Clearly, it was a location where the scrutiny was very high upon this project. I don't think a higher profile location in the intermountain west could have been selected to experiment under SEP-14 in the design-build world.

The results of the project, there were many naysayers about this project as it began. There were those that said the budget would be busted, as many other mega-projects had been busted around the Country. There were those that said the schedule could not be

kept, that we couldn't deliver this project in the time frame that we talked about. There were those that said that if you managed to build this project on time and within budget that the quality won't be there.

Well, we are now six years after the completion of this project, and all the naysayers have gone away, because the project was completed ahead of schedule, four and a half years, where traditional design-bid-build methodologies would have taken at least ten years to complete. The project was completed in four and a half years and it was completed $32 million under budget, and the quality speaks for itself. Six years later, we have had no issues with quality on this project.

So with this glowing review of design-build, one might ask, why don't you build all of your facilities under this technology, this design-build technology. And the answer is, the tried and true design-bid-build is still tried and true. It still works for many, many projects. We do hundreds of projects in the State of Utah every year. And of those hundreds of projects, the vast majority of them are still design-bid-build.

However, those complex projects that have risk associated with them are projects that we look at design-build or other project delivery methods, such as CMGC, to deliver those projects in a timely fashion.

Now, clearly, on I-15, the reason that we chose design-build was schedule. Ten years was too long for the local economy, it was too long for our customers, it was too long for businesses, it was too long for the State of Utah. Accelerating that project to four and a half years completion was something that was good for us, not to mention one little thing that was going to happen in 2002: we were going to host the Olympic Games. We couldn't have this project under construction during the Olympic Games. We are very fortunate, we completed the project prior to that.

Now, some of the other technologies that we are experimenting with under SEP-15 are CMGC, construction management general contractor. This also enables the private sector to unleash their creativity as they come to the table during the design phase of the project and help us find the best way to cost-effectively complete the project. We have completed a number of CMGC Projects and will continue to use that technology and other new technologies to deliver our projects.

I would encourage Congress to continue to allow the States the flexibility to use these tools on Federal projects and other projects within our system, so that we're able to serve our customers in the very best method possible.

It has been a pleasure to be here with you today. Thank you.

Mr. DEFAZIO. Thank you.

And now I am pleased to welcome Fred Hansen, the Honorable Fred Hansen, the General Manager of TriMet, a wonderful entity in my home State of Oregon, although alas, I do not represent Portland and do not get to ride it to the airport like some of my colleagues. I still enjoy it when I'm in town.

Mr. Hansen.

Mr. HANSEN. Thank you, Mr. Chairman. And I am pleased that you do ride it when you are in town.

For the record, I am Fred Hansen, General Manager of TriMet. I have left in front of each of you an article from the New York Times, yesterday, on their 36 hours in Portland. In it, they referenced that Portland does have an excellent public transportation system. I am very pleased they recognized that.

I am here to speak to you about that, in fact, that very airport line that the Chairman referenced. Let me be clear on hat the arrangement was and the building of that line was. First, it was a line that had been on our master planning for the region for a number of years. In fact, we would not have expected to be able to get to it probably for somewhere in the 15 to 20 year range. It had, however, had some of its right-of-way set aside when an interstate freeway was constructed, I-205.

Second, it was on property or through property, this alignment for the airport light rail, that was under-utilized, Portland Airport property. Now, it was public property. The project began by receiving an unsolicited proposal from Bechtel Enterprises of San Francisco. In it they proposed not only building the alignment, that is, through a design-build contract, but also to be able to develop additional land for private development.

At the time, the airport was considering major new construction for parking, very expensive parking. We were looking for ways to be able to minimize the amount of parking that would be needed, and concluded that the concept of being able to utilize light rail to the airport was very important.

The actual agreement represented a 99 year lease on 120 acres of under-utilized public property owned by the airport. In fact, so under-utilized that at the time of the lease there were still cows grazing on it. Bechtel, for the overall construction cost of the project, $125 million, contributed $28.3 million of that for the actual construction. Let me stress that during this whole process, all environmental regulations were completely complied with, NEPA, in fact, an environmental assessment was completed on it.

Let me also stress that in this project, there is no public asset that is not totally under the control of public entities, in this case, TriMet, the transit agency, that is both the light rail alignment and the operation of that light rail alignment is by a public entity.

What was at issue was the private development rights on that 120 acre leased area. A mixed-used proposal by Bechtel brought that forward.

What about the benefits? The benefits are that we were able to bring this light rail alignment from plans to actual reality decades or years earlier, if not decades earlier than we would have. Number two, it was streamlined. We ended up being able to complete that construction from the time of the initial concept to opening in four and a half years, probably about two years shorter than it would have been had we gone through the full funding grant agreement processes that would have been required had we utilized Federal funds in this.

Then lastly, the benefit of a major mixed use development was proposed for this site. But some of the lessons learned are that we do need to be able to make sure that the project manager, in this case, TriMet, was a sophisticated entity, that is, one that was fa-

miliar with managing large construction projects, which we have a long history of doing, both on time and on budget.

Second, it required a sophisticated entity, in this case Bechtel Enterprises, to be able to be partnering with us in a design-build. The project itself opened for revenue service on September 10th of 2001, an auspicious day. Obviously, the recession that followed meant that this project did not materialize in terms of the private development as quickly as we would have hoped. And yet it is now being built out, and there is a new IKEA anchor tenant that will be opening within the next several months.

Conclusions are, we were able to achieve a project years ahead of schedule that would have been impossible without that involvement. Number two, that the development risk was in fact shouldered by the private entity, and yet, the public asset was fully within public control. This is a wonderful public-private partnership with Bechtel. We would do it again in a second.

Thank you. We would be happy to answer any questions.

Mr. DEFAZIO. Thank you. I thank all the witnesses for staying within their allotted time.

Mr. Ray, I am curious. First on SEP-14, what is the current status of SEP-14 in terms of design-build and other allowances? Do you still have to individually review and approve those projects, or are they now routinely approved?

Mr. RAY. Congressman, thank you for the question. SEP-14 is still active. But the original intent was to look at lane rental, warranties, A plus B and design-build. Those have all been mainstreamed, they're all accepted practice now. But certainly, SEP-14 is still available to explore and experiment within innovative contracting. But those four, the intent that it was really created for and of course TRB suggested those four as the ones that we focus on, those have been mainstreamed and you do not need FHWA headquarters approval to move forward.

Mr. DEFAZIO. Not even the warranties? I thought the warranties, there was some ongoing concern about warranties.

Mr. RAY. Well, there are certain types of warranties that are acceptable and certain that are not. I mean, of course, the Federal aid program isn't meant to maintain the highway over long periods of time. But some warranties are acceptable, and I believe we have spoken about that. I can get more direct information on that for you for the record if you would like. But there are certain types of warranties that are acceptable now.

[Information follows:]

P. 22
Line 465

WARRANTY USE

QUESTION: What types of warranties and what types of projects are acceptable for use in the Federal-aid highway program? (Chairman DeFazio)

ANSWER:

- In 1995-1996, the FHWA conducted a rule making for the use of warranties on Federal-aid highway projects. The April 19, 1996 final rule revised the FHWA's warranty policy in Title 23 CFR 635.413. This allows the State DOTs to include warranty provisions in National Highway System construction contracts, as long as the warranty provision:
  a) is limited to a specific construction product or feature,
  b) is not used for routine maintenance, and
  c) does not place an undue obligation on the contractor for items over which the contractor has no control.

- The State DOTs have been using short-term (1-3 years) material and workmanship warranties, and longer-term (3-10 years) performance warranties for various highway products and features.

- A National Cooperative Highway Research Program research project, No. 20-07(201) – "Use of Warranties in Highway Construction", is the most current summary of warranty use. The preliminary findings show the following use of warranty provisions:

  a) Hot mix asphalt pavement warranties, 23 State DOTs, more than 700 projects,
  b) Portland cement concrete pavement warranties, 17 State DOTs, more than 370 projects,
  c) Micro-surfacing / crack treatment / chip sealing warranties, 9 State DOTS, more than 140 projects,
  d) Bridge painting / bridge component warranties, 15 State DOTs, more than 200 projects,
  e) Traffic signal / lighting / Intelligent Traffic System component warranties, 8 State DOTs, more than 30 projects,
  f) Pavement marking warranties, 15 State DOTs, more than 60 projects, and
  g) Other miscellaneous component warranties (culverts, dowel bar retrofit, miscellaneous drainage features, roadside facilities, etc.), 8 State DOTs, more than 25 projects.

Mr. DEFAZIO. Okay. So a warranty isn't implicit. I mean, theoretically I guess we inspect a project as it goes along, specifications have to be met, you inspect a project when it is done. If specifications have been met, there is a sign-off. Normally there would not be a warranty past that point.

Mr. RAY. Under the traditional design-bid-build mechanism, am I understanding correctly?

Mr. DEFAZIO. Well, any. I am trying to get a grasp on what the concern is about warranties. There seems to be a new concern about the need for warranties. I am wondering why warranties are becoming, I am wondering whether we have inadequacy in the inspection process, therefore people are not as confident that the specifications have been met and we want to see some performance beyond that, or we have experimental design, so we don't have confidence in them. I am trying to understand the need for warranties beyond, we met the standards, it was constructed, it is done.

Mr. RAY. Congressman, I think that specifically, the specifications should be met. They would be inspected and to the best of the inspector's ability, of course, they would determine that those specifications had been met at the time of acceptance.

However, there are certain things with regard to, let's take pavement, for instance, rutting and that type of thing. Under design-build, the contractor has more flexibility in how to meet the project specifications set forth by the State DOT. So they may determine the exact mix——

Mr. DEFAZIO. So they may be using, they may not be meeting a certain temperature standard the State requires for mix, or they may be applying it in different weather. Therefore, there would be some sort of a warranty that would cover that, but doesn't add to the cost of the project and doesn't get us into maintenance issues.

Mr. RAY. If I am understanding what you are saying correctly, I think that is right. I think basically where we are going is the State DOT would set forth the specifications on exactly how that road or how that asphalt or concrete should wear.

Mr. DEFAZIO. Right. But you are saying you give them latitude in how they apply it?

Mr. RAY. Absolutely.

Mr. DEFAZIO. Okay. I don't understand SEP-15. The staff and I are struggling a bit with SEP-15. We are trying to understand. Give us a specific that you are looking at in SEP-15.

Mr. RAY. An example, well, SEP-15 is very broad in the sense that it allows experimentation with all types of project delivery mechanisms within Title 23. Just to be clear, we are only offering up experimentation within Title 23.

Mr. DEFAZIO. Right. But if you have issues within Title 23, Title 23 is referenced for say, a number of environmental concerns, it is also referenced for some labor concerns. But their statutory authority exists outside Title 23. So you couldn't waive those environmental issues or those labor issues within Title 23, is that correct?

Mr. RAY. Well, we believe that Section 502(b) of Title 23 gives the Secretary the ability to experiment within the confines of Title 23. The goals of——

Mr. DEFAZIO. But you are not answering the question. If something has basic statutory authority outside of Title 23, let's use

Davis-Bacon. Always a hot button issue around here. Do you believe that you have some authority to somehow waive Davis-Bacon because it is referenced in Title 23, since it has statutory authority outside Title 23?

Mr. RAY. I am sorry, sir, sorry for the confusion. You are absolutely right.

Mr. DEFAZIO. Right.

Mr. RAY. If it is referenced somewhere else, if it is not squarely within the confines of Title 23, then, no, we do not have the authority to experiment there. DBE is a perfect example of that. It is outside of Title 23 and we are not there. NEPA is clearly another. The Clean Water Act is another.

And I just want to mention, the goals of SEP-15, which I think is kind of informative, if I may, are delivery flexibility, encouraging innovation and improving the timely project construction. Lastly, promoting P3s. We believe that it is an area we should be looking at and promoting. We believe there is value there.

But just to be clear, SEP-14 has tons of experiments under it. Under SEP-15, we only have seven projects currently underway and an eighth letter of interest that we are considering. We are in a very youthful stage of SEP-15 in terms of the data that we know, the information that we know and where this is going.

Mr. DEFAZIO. The FHWA under SEP-15 says here, alternative ways to accomplish NEPA and environmental compliance. What are we thinking about there?

Mr. RAY. There are certain——

Mr. DEFAZIO. Because we proposed some very far-reaching proposals to streamline environmental review of projects. We have yet to see the guidance or administrative rules come out to implement what Congress legislated a couple of years ago now. Does this mean you are going to move ahead and meet some of the, finally do some of the streamlining? That wouldn't need to be SEP-15. We mandated it by law and it hasn't yet been accomplished. A lot of States are not even aware we gave them that authority. They keep complaining to us, but we have asked the Bush Administration to, we put very significant streamlining into the bill.

Mr. RAY. If I can address the second issue first and the first issue second, with regard to environmental processes, there are certain environmental processes that are dictated in Title 23 that relate to NEPA and other environmental reviews. Those, although I am not aware that we have experimented with those with SEP-15, those certainly are available for a State to apply to us. But clearly, going back to the original point that I think we made a question or two ago, if it is referenced in another area of the Code, then that is not within the purview of SEP-15.

Mr. DEFAZIO. So when could we expect the rules to implement the streamlining that Congress envisioned statutorily a couple of years ago?

Mr. RAY. Congressman, I apologize. I wanted to be clear on my facts.

The five-State pilot, if that is one of the ones that we are talking about, is actually already out there. Some States have chosen to take outvoting of that and some States, we understand, will not.

For instance, Ohio recently, I think formally indicated that they would not be pursuing their status as a member of that.

Mr. DEFAZIO. I just want to direct one other question, I am using more than my allotted time, to the next witness, to Mr. Horner. Thank you for those answers. We will get back to the environmental issues either later or at a future date.

In your testimony where you talk about the pilot projects and you list criteria, I am a bit puzzled about two things. Roman numeral IV, whether the project is part of a congestion mitigation plan that incorporates system-wide congestion pricing. What does that mean? You might have noticed in the newspapers locally where there was a little proposal here to have some peak pricing increases, which got stomped on so bad they were pulled back really quick. Are you saying we want other cities to experience that same wonderful public backlash? Because you are saying you want it mandated system-wide. Now what are we talking about here?

Then the second part of the question is, over here, we are trying to mitigate highway congestion. Got it? Over here, we are trying to make people use transit. It is more efficient, more fuel efficient. So over here, you are talking, gee, we want to price people off the roads, and over here, gee, we want to price people out of rush hour in mass transit. These seem to be contradictory goals.

Then my third observation is, people don't choose when they go to work. So it ultimately becomes punitive. You have to go to work, we are going to price you off the highway, we are going to price you off the mass transit. You had better live downtown, oh, you can't afford that, because that is where all the yuppies live. So I guess you had better get another job out in the suburbs.

Could you address that, please?

Mr. HORNER. Sure, I would be happy to. First, and thank you for that question, Mr. Chairman, that three-part question.

First, with respect to how the particular criterion operates in the context of the pilot program, that is a consideration. It is not a requirement that any applicant must——

Mr. DEFAZIO. But how is it weighed? It looks like here, do we have a real formula, it is going to be 10 percent here, 20 percent here? You can't have really subjective criteria for people. How much are you weighting that one?

Mr. HORNER. Thank you for that question. We have not assigned on the face of the document or internally particular weightings to those several criteria that you are referring to.

Mr. DEFAZIO. Like the black box. You say to people, you might or might meet that one and you might or might not get authorized because you didn't meet that one, which doesn't have a specific weighting.

Mr. HORNER. That criterion is not dispositive. It is a factor that we take into account.

You asked secondly whether it was a contradiction of policy to endorse the use of transit on the one hand and encourage congestion pricing of roadways on the other.

Mr. DEFAZIO. And then congestion pricing of transit. So we have now driven you out of your car, you are on transit, that is what we wanted to do, but now we are going to impose it on you there.

We are going to extort you one way or another here, you have to get to work, right?

Mr. HORNER. With respect to travel during to work, we have found that approximately 50 percent of travelers during peak periods are discretionary travelers, which implies that not everyone using the roadway during peak times is——

Mr. DEFAZIO. It might depend on the definition of discretionary, you have to take your kids to school, but you are not going to work, that is discretionary?

Mr. HORNER. I would be happy to tell you how we define——

Mr. DEFAZIO. Sure, I would love to hear that analysis, if we could have the 50 percent.

[Information follows:]

P. 30
Line 656

4/17/2007

Vehicle Trips	Percent of Vehicle Trips							
	AM Peak		PM Peak					
	6-9 a.m.		4-7 p.m.		All Other Times		Percent of all Daily Trips	
Total (Work+non-Work)	**100.00%**	**35.4 bil**	**100.00%**	**84.9 bil**	**100.00%**	**113.0 bil**	**100.00%**	**233.0 bil**
To or From Work	51.1%	18.1 bil	24.7%	21.0 bil	14.0%	15 8 bil	23.5%	54.8 bil
Directly Trips (no stops)	33.7%	12.0 bil	14.4%	13.1 bil	10.1%	11.4 bil	15.6%	36.4 bil
Commutes with 1 or more stops	17.4%	6.1 bil	10.3%	7.9 bil	3.9%	4.4 bil	7.9%	18.4 bil
Non Work								
Non-work trips	48.9%	17.3 bil	75.3%	64.0 bil	85.6%	96.7 bil	76.5%	178 bil
Non-work shopping Trips (percent of non-work)	20.9%	3.6 bil	30.9%	19.8 bil	33.9%	32.8 bil	31.5%	56.2 bil
Non-work shopping Trips (percent of all trips)	10.2%	3.6 bil	23.3%	19.8 bil	29.0%	32.8 bil	24.1%	56.2 bil
All Shopping Trips (includes those in work tour)	13.5%	4.8 bil	26.0%	22.1 bil	30.4%	34.2 bil	26.2%	61.1 bil

Source: 2001 National Household Travel Survey, FHWA Office of Highway Policy Information
All days, all vehicle trips
Shopping trips include shopping for meals

Mr. HORNER. I would be pleased to provide that to you, and the basis of that statistic, absolutely. But generally, we don't think it a contradiction in policy to encourage congestion pricing and transit in tandem as we contemplate in the pilot program, for the reasons that we have found around the world, that congestion pricing during peak periods results in enormous benefits to transit. Let me say that there are at least two. The first is dramatic increases in ridership for transit. We needn't look further than London, actually, to see how congestion charging and moreover, a rather crude form of congestion charging has produced not only increases in ridership but more frequency in service, better service, improved reliability and the like.

So we think it provides ridership benefits. We also think it provides localities an enormous financial benefit to support transit, because congestion charging is based not on financial need per se, but on the need to manage the flow of traffic and achieve conditions of free flow on the facility. Congestion charging may produce substantial surpluses that may be dedicated by locality to public transportation. So we see, depending on your point of view, we see a virtual circle created by the effects of these two policies working in tandem, rather than a vicious one, as it were.

Mr. DEFAZIO. All right, well, I don't exactly share that, and I think the public here locally certainly didn't share that view when they attempted to jack up the rates during congested times. I think there was an article last weekend, I wasn't here, but it has been referenced to me, where the experience now with some of these hot lanes is that some people are paying up to $40 one way. That sounds like sort of a Lexus lane or a Hummer lane to me. It doesn't sound like something for average people.

I think we have to keep in mind that most workers don't have a tremendous amount of discretionary income. If you make it $40 bucks to get to work in a timely in your car, then they are going to go to transit. If they go to transit and we raise the price there, it may create a surplus or it may have unintended effects. So, it might create a surplus in the short run while these people desperately try and find another job that doesn't require them to go into the city.

Thank you for that. I have gone well over my time. Mr. Duncan.

Mr. DUNCAN. I want to yield first to Dr. Boustany. Dr. Boustany was here first.

Mr. BOUSTANY. I thank the Ranking Member and Chairman.

Mr. Ray, the SEP-14 program has had demonstrable success. It appears to me that SEP-15 is going to be a very complementary program to SEP-14, creating additional flexibility, and allow for some creativity among the States to deal with their backlog of highway projects. My understanding from our memo was that seven projects have been approved in three States; four have gone on to the development agreements. What seems to be the hurdle, since the program has been in existence since 2004? Why haven't more States availed themselves of this?

Mr. RAY. Congressman, thank you for the question. It is actually a wonderful question. I have had the opportunity and the pleasure to speak quite a bit around the Country. Almost a standard issue line in all my speeches is, send us your creative ideas. Make us

sweat, really make us think about the program and what would be acceptable, what would be appropriate to experiment with and what wouldn't.

Unfortunately, we really, as you have cited, we haven't gotten as many applications as we might like. So if you could encourage your constituents to apply, we would welcome that application.

Mr. BOUSTANY. Sir, it is not a knowledge deficit about the program. The State DOTs know about it. Do they find the task daunting? In other words, the burden is on them to come up with the creative approaches, looking at the existing law, trying to recommend waivers. Is it a matter of expertise in the State DOTs, do you think?

Mr. RAY. I think maybe less that than, it is interesting, on one occasion, a gentleman from the State DOT came to me and said, well, just tell us what you want to experiment with and we will craft the application to look like that. And I told him, there really is no hidden agenda here. We are opening ourselves up to experimentation. We are opening ourselves up to your ideas. What are obstacles in the current program that you have, and let's look and see if this program may be available to you.

So I think that is an issue that people really are scratching their head, trying to figure out what exactly do we want to experiment with. People complain about the processes often, but they don't always know exactly what the tweak is that they want to see to fix it.

In terms of expertise, I think it may be less that. But certainly it requires a lot of thought before you walk down a new road, especially when you are holding the trust of the American people or given States' people and their money. So I think that there certainly is a fair amount of thought, do we have the expertise to carry out what we might be suggesting. But I think it is a lesser component.

Mr. BOUSTANY. Do you expect legal challenges down the line as this program gets implemented more widely? In other words, States come up with suggestions on waivers. After you study it, if you agree, let's go forward, do you expect court action or legal action?

Mr. RAY. Well, Congressman, I am an attorney, so I always expect court action in some respect.

[Laughter.]

Mr. RAY. I can tell you we think very carefully about that when we see an application, we try to look down the road to see where that takes us. We are trying to be very responsible stewards of the laws that you give us and make sure that we are living within the spirit of those.

So I think there is always that possibility, as with anything else in our culture today. But I would hope not.

Mr. BOUSTANY. Okay. And one last question unrelated to that, and my question is, why does it matter, can you elaborate on why it matters for States to begin issuing RFPs, awarding design-build contracts and issuing notices to proceed prior to the conclusion of the NEPA process? Just elaborate on why that is important, for the record.

Mr. RAY. Sure. I think there is a fair amount of time savings involved there. When you can go forward with that, after you may have done your preliminaries on, but not before you have done your final design, there is a tremendous amount of time savings that can be had. Of course, as with everything else, time is money. So you are both reducing the impact on the public at large, and the amount of time that it takes to actually construct a project. You are also creating an opportunity for greater flexibility and greater innovation between the designer and the builder.

There is a lot of things that go into that. But I think at the end of the day, and so as to not burn up a lot of your time, I think at the end of the day, you are talking about time efficiencies, and of course, time efficiencies equal cost savings.

Mr. BOUSTANY. Right. Thank you. My time is just about up. Thank you, Mr. Chairman. I yield back.

Mr. DEFAZIO. I thank the gentleman.

We will take members on our side in the order in which they came in and remained here. Mr. Walz will be first. No? Want to pass? Then we would move to Mrs. Napolitano.

Mrs. NAPOLITANO. Thank you, Mr. Chair. I am sorry I arrived late, so I was not quite prepared for asking the question I normally ask after hearing your testimony, but I will ask some questions that I have inherently developed through the years of working in transportation in California, both as an employee and as a member of the State assembly.

And it goes to the issue of investments in public-private partnerships, especially on Highway 91 in California, if you are familiar with it, and the fact that the State had to buy it back because of a non-compete clause that was included in that, which then made the cost of that partnership almost triple in cost. That is a big issue, and I am not quite sure how the private sector is looking at the development of something that is going to be more protective of the investment of the public funding, the money that goes into some of these projects, as well as the concern for the safety, which a non-compete clause would then prevent for additional lanes to be able to allow more flow of traffic instead of having it backed up and causing accidents or having environmental pollution from cars lined up. We call it the biggest parking lot in the U.S., the State of California's Santa Anna freeway. But that is another story.

But I would like for you to comment on what the industries or the agencies are thinking about being able to serve the general good and still be able to have a profit. And that would include, as the Chairman was alluding to, some of the protection of Davis-Bacon, being able to ensure that those other areas of concern are also included into that partnership. Any one of you.

Mr. RAY. I will start first. Congresswoman, thank you very much for the question. I think it is very important. I am familiar with the project and as you noted, southern California and certain aspects of it are known as the largest parking lot in the world. The Secretary is incredibly aware of that, and that is actually why one of the prongs of the congestion initiative is focused just on southern California. Clearly it has the worst congestion in America and we are very concerned about that.

First off, I think that the State DOTs may be outsourcing operations and maintenance of certain projects. But what they are not outsourcing is safety and the public interest. I think as we gain more experience in this, we will be more attuned, we, and I am being inclusive of the FHWA and the State governments, the State DOTs as the owners of the facilities, will become more attuned and more adept at protecting those public interests.

I say this quite often to State DOT officials when they ask, the beauty of these P3 arrangements is that they start off, the agreement starts off as a blank sheet of paper. As any good commercial lawyer could tell you, if you present a risk, if you present a problem, we can then draft a clause that protects against it.

Now, what impact that has on the other side of the table is a question. You may make the deal unattractive. But certainly we can protect those risks. If we identify them, we can protect them as lawyers.

I would say that right now, the States are becoming much better at identifying those risks. I don't think anyone has ever said that these P3s are without risks. They certainly have them. But they also have tremendous benefits as well that can be harnessed and realized for the public good.

As to what the private entities can do for the public good, and in projecting the public interest there, I think there is a tremendous amount that they can do. It is really just the synergies that are created between market forces and what people want on these types of facilities. They don't want to sit in a parking lot. And pricing can actually generate the capacity that is needed for free-flow conditions. It is not just the pricing. It is also, for instance, we have recently been made aware that Macquarie, on the Indiana toll road, drives up and down the road with a car with a large magnet underneath it to pick up shards of metal and nails, because they don't want people to have flat tires.

Now, one might think that they don't want people to have flat tires because it is a good customer service, and maybe that is true. I would like to believe that. But in reality, I think the answer may actually be that they don't want people to have blow-outs that create accidents that create slowdowns.

Mrs. NAPOLITANO. But that doesn't address the issue of the public-private—actually, many of the issues that have arisen, and I sat on California Transportation for six years, are issues that are when we go out to bid, if they go out to bid, and most times they do, the change order dramatically increased the cost of the project. Right? And so somewhere along the line, there is no protection for the taxpayer who is supposedly putting it in the hands of the agency to go out and get the best bid, not necessarily the lowest, that is going to deliver a project that is going to stand for a long time, rather than like in the 105, where there was a sinking and the State had to come back in and do the repair.

And things that now bother me are outsourcing to foreign entities and hiring people out of our United States to come in and do the job. And who are we going to go back and try to get a repair or refund or things that we normally would require of our own agencies that work within the United States? So those are issues that really, like you said, California now has this transportation

bond that is going to attract a lot of agencies coming in from the outside, as well as from other States, to do work in California for the repair or the increase, in like Santa Anna, we are going to be expanding it. Yet how do we protect the taxpayer and the safety of the taxpayer and do it at a fair price, keeping in mind that this has to be done? But we don't want to go 10 years down the road and have to do repair at a cost that is exceedingly unwarranted.

Mr. RAY. If I may, Congresswoman, it is a wonderful observation. I would mention that I think innovative contracting is actually going to do a lot to help solve that. Under the traditional design-bid-build mechanism, we are required to take the lowest bid. There isn't really any assessment of quality or reputation or anything, other than just the lowest dollar bid.

With innovative contracting, we are allowed to take into account a broader array of interests, and also there is the opportunity as Chairman DeFazio and I discussed a moment ago about warranties. You mentioned whether or not there would be significant rutting or other things that may create problems for the public down the road financially. Warranties can come in as innovative contracting is utilized as well.

The last point that I would like to make is that I think with regard to change orders, when you use design-build, it is a much more difficult task for the State DOT up front, because they have to clearly define exactly what they want at a very early stage, where the traditional design-bid-build mechanism allows them to flesh that out over a series of months. With design-build, it is very important that they have a very clear understanding of exactly what they want, because that is going to define the performance specifications that they give to the private entity, the contractor.

In terms of the actual change orders, once the contractor and the designer has that clear set of specifications, it is assured, because they are working in tandem, versus the traditional method, where they are siloed apart. They are working in tandem under design-build, and it reduces, the data is very clear, it reduces the need for change orders, which of course reduces additional expenses.

Mrs. NAPOLITANO. The one question I would ask, and that is, why not have a public inspector rather than a building agency inspector actually check it out? That has been disastrous in some of our areas in California.

Mr. RAY. One thing is very clear, Section 302 allows, Congress has spoken, and it allows States to outsource certain things as needed and as appropriate. But we do require that the State DOT be the responsible entity in charge. That means they need to be aware of the day to day operations, they need to be the one doing the inspections. Of course, we would expect the private entity to do their own inspections and make sure that they follow up behind their subs and so forth and so on, and make sure that they are doing that.

But the State DOTs are the responsible entity. They are going to be the owner and they absolutely do need to be the ones out there following up and making sure that the quality is there.

Mr. DEFAZIO. We will do a second round.

Mrs. NAPOLITANO. Thank you.

Mr. DEFAZIO. Mr. Duncan.

Mr. DUNCAN. Thank you, Mr. Chairman.

Mr. Horner, do you agree with Mr. Hansen's statement that to comply with FTA rules and regulations would have added at least two or more years onto that project in Portland? And if you do agree with that, why is that? Is it not possible to comply with some of these rules and regulations and go through the process at the same time the States and cities are going through those procedures?

Mr. HORNER. Congressman Duncan, Ranking Member Duncan, thank you very much for that question. Although I am not, I don't know the specific about Mr. Hansen's project, I don't disagree that it takes a long time, indeed quite a long time, unfortunately, to approve some applications for full funding grant agreements to support transit projects in the United States through FTA.

We are endeavoring in multiple ways, however, to expedite the process of review of applications in ways that preserve, indeed enhance our stewardship of the Federal dollar without compromising other considerations, including environmental considerations. I could go on in detail about why this may be so. But I agree with you that it takes long and FTA agrees also that it does take a long time. By no means do we think it should be longer or as long as it is now. Indeed, we think it should be shorter, and we are working on finding ways to shorten the process.

Mr. DUNCAN. Well, whenever we hear people talk about the Chinese, for instance, who seem to be coming on like gangbusters in every area, they seem to be able to approve major, mega-projects in very short times. It seems to me that we are going to be in trouble if we don't speed up some of these things. You say you are endeavoring to speed up the process. Has the process quickened in recent years? Is there any progress in that area? For instance, 10 or 20 years ago, did projects take much, much longer for approval and now we are seeing some progress in that area?

Mr. HORNER. Sir, I don't know the exact answer to that question. I would be happy to provide the answer, a statistically based answer to your question. But it is my impression that we are doing better. It is also my impression that perhaps in the early days of the program, it took much less time than it does now. But sir, I will provide you an answer to that question on the record.

Mr. DUNCAN. Director Njord, we will have a witness in the second panel who apparently will testify that it is very, very difficult for small businesses to participate in these so-called mega-projects. There seem to be more and more mega-projects around the Country. Did you take any steps to ensure that small businesses were included in the process, or do you think that that is just a false statement or incorrect statement on the part of that witness?

Mr. NJORD. Thank you for that question. I don't know what the witness will say, but our experience in design-build and innovative contracting has been that small contractors do have an opportunity to participate, not as a prime, obviously. You take a project that is over a billion dollars, you can't have a small contractor that can only bond for a million dollars be the prime contractor. However, they have participated.

There was a lot of concern in the State of Utah when we launched this project that all the small contractors would be

shoved out, they would be pushed out, they wouldn't be able to participate, they would be put out of business. None of that took place. And in fact, many of those small contractors had a small portion to play, a commensurate portion to play within the larger project.

Now, these innovative contracts are not just for mega-projects. You can do them on all sorts of projects. We have used design-build on everything down to a traffic signal, which is a quarter of a million dollar project, which any contractor can do for us.

Mr. DUNCAN. Can you use both design-build and CMGC innovative contracting methods together? Are they mutually exclusive in some ways? What would be your thoughts on that?

Mr. NJORD. The two methodologies are very different. The approach for each one is very different. In a design-build world, you hire a contractor who then hires a designer to work with them to simultaneously design and construct the project.

In CMGC, you hire a contractor and you hire a designer and then you marry those two. So they are very different.

Mr. DUNCAN. Mr. Hansen, when Bechtel approached you with something that you were interested in, since it was unsolicited, did you just think it was such a great idea and since they were the, since it was more or less their idea, you just decided, did you just decide to go with them, or did you check with other companies to see if they might be interested in doing the same type of deal?

Mr. HANSEN. Thank you, Congressman Duncan. The issue for us has always been on unsolicited proposals that we must have an understanding of what else is in the marketplace that is interested. This particular project was an unsolicited proposal to our port of Portland, that is the airport owner. They do go through a process of making sure that there were, if there were other interested parties, to be able to bring forth. Our specific policies at TriMet require us to be able to publish any unsolicited proposals and give adequate time for any other interested parties to come forward, express interest in the same project before we may move forward. In this case, no other entities were interested in moving forward and Bechtel was chosen to be able to move forward.

I might also add that on design-build, this was a design-build. But I think it is all too easy to kind of look for that silver bullet, that is a particular contracting method. I like to think of it more as silver buckshot, that is, there are numerous different types of contracting methods. They must be adapted to the specifics of the area that are, and the type of contracting, the type of project that it is. Thank you.

Mr. DUNCAN. All right, thank you.

Mr. Ray, in your testimony you say that innovative contracting can help reduce congestion. Do you have any specific examples of where congestion has been alleviated and to what extent by some of these innovative contracting methods?

Mr. RAY. Congressman, I appreciate the question. Unfortunately, I don't have the exact data at my fingertips. But I think from a generalization—I would be happy to get some data to you, for the record. But I think as a generalization, lane rental and A plus B, which requires the contractor to value the time that he is using the facility, absolutely lessens the impact that a given municipality or given State would feel from a certain project.

[Information follows:]

P. 47
Line 1073

USING INNOVATIVE CONTRACTING TO REDUCE CONGESTION

QUESTION: How can innovative contracting reduce congestion? Please provide specific projects information? (Duncan)

ANSWER:

- The design-build project delivery method reduces the overall time necessary to deliver a transportation projects and also reduces the impact on the traveling public by minimizing the impact during construction. Design-build contracts can be structured to include lane rental provisions, incentive / disincentive provisions or cost-plus-time bidding procedures. The contracting agency may also evaluate and give priority to technical proposals that ensure that the impact to the traveling public is minimized during construction.

- The FHWA's Design-Build Effectiveness Study – Report to Congress (required by TEA-21 Section 1307(f)) documented the effectiveness of the design-build project delivery method. In responding to a study survey question regarding schedule impacts, 62 contracting agency managers estimated that design-build project delivery reduced the overall duration of their projects by 14 percent.

- A May 2005 report by Tom Warne and Associates, LLC titled: "Design-Build Contracting for Highway Projects - A Performance Assessment" compared actual design-build contract times and the estimated time for similar design-bid-build projects. Table 3 in this report documents project schedule savings by using design-build. In general, a reduction in the overall project delivery schedule will also result in a reduction in congestion as road users are exposed to work zones for a shorter time period.

Table 3 – Schedule Comparison for Design-Build and Design-Bid-Build

Project	Design -Build Time	Design- Bid-Build Time	Notes
AZ I-17DB	20	60	5 year under conventional design-bid-build
AZ SR 51	24	60	3 project together – 4-1/2 – 5 years
AZ US 60	24	54	4-1/2 years
CA Eastern Toll	40	N/A	N/A
CA San Joaquin	32	56	Add 2 years for design
CO E470 Segment 4	30	N/A	Projected 4 years, finished in 3, no analysis for design-bid-build
CO E470 Segment 2&3	46	N/A	N/A
CO I-25 Road Rail Expansion	56	N/A	Original schedule end of 2008 never analyzed time for design-bid-build
CO NW Parkway Denver	27	N/A	If CO DOT process was used it would have doubled the time if the money was available
FL Hathaway Bridge	48	72	Project would not have started yet. Total time

			approximately the same as the design-build project plus 24 months for design
MN ROC 52	49		The project would have started construction two years later and the construction would have taken a minimum of 5 years vs. the current 3 years schedule..
SC Carolina Bays	84	240	
SC Conway Bypass	36	180	15 years for design, right-of-way and construction in segments
SC Cooper River Bridge	48	96	8 years
TX SH 130	60**	N/A	No analysis, but would have required 300 additional people to administer.
UT I-15 UDOT	51	96	Eight years
VA Dulles Greenway Toll Road	24	N/A	No analysis, fored team then approached VDOT
VA Rt. 28 Corridor Improvements	24**	36	If not for design-build, the TI would not have been started.
VA Rt. 288	48	*	It would have been broken up into several projects.
VA Rt. 895	60	N/A	It wasn't in the program to be designed until 2012-2015. There is no idea how long it would actually take to complete construction.
*design-bid-build not an option due to financial constraints			
** not complete			

- Caltrans has been using cost-plus-time bidding on all contracts greater than $5 million and daily road user delay costs of $5,000 or more. A 2004 study by Pinnacle One for Caltrans found that there was an average time savings of 27% from the Engineer's estimate of days and there was no indication that during construction cost-plus-time projects average more growth than non-cost-plus-time projects.

- A 2003 study by the Florida DOT found that cost-plus-time bidding techniques reduce the average contract time by approximately 11 to 12 %.

Mr. RAY. Lane rental, to be honest with you, can even go down to the time of day. So if you wanted to make sure that the facility was open and available for use during rush hour or peak travel times, then you can get down to that level of specificity and make sure that the impact is gone, or is mitigated in such a way that the public feels the burden less on a major construction project.

Mr. DUNCAN. How many places do you know of that are actually using these lane rental procedures?

Mr. RAY. Again, Congressman, I apologize, I would have to get that data for you. It has not received the type of attention or the embrace that I think some of us might have hoped. But it is being utilized, and I would be happy to get that data for you as well.

[Information follows:]

P. 47
Line 1089

USE OF LANE RENTAL

QUESTION: How often is lane rental is used in highway projects? (Duncan)

ANSWER:

- The use of the lane rental contracting provision varies throughout the US. Twenty 26 state DOTs recently responded to an FHWA survey concerning specification requirements. One survey question asked about the use of lane rental provisions in contracts.

- The following is a summary of lane rental provision use by the states that responded affirmatively to this question:
    - Standard operating procedure on most projects – Florida,
    - Selected projects – Colorado,
    - Occasional use – Idaho, Minnesota, Washington, Wyoming, .
    - 10% of contracts – Indiana,
    - Approximately 5 contracts / year – Iowa,
    - Approximately 2 projects / year – Ohio, and
    - With regularity on urban area projects – Oklahoma.

Mr. DUNCAN. All right, thank you very much. Thank you, Mr. Chairman.

Mr. DEFAZIO. Thank you.

If there are no other first round questions—Ms. Fallin.

Ms. FALLIN. Thank you, Mr. Chairman. Just a couple of quick questions. In my home State in Oklahoma, it seems like it takes forever to get something completed. So I was interested in anything that we can do in Congress or if there is anything that the Federal Highway can do to help various States complete projects on time. Is there any type of rules, regulations or things that really hamper private sector partnerships? I know there are. But what can we do to help complete projects in a more timely manner so it doesn't cost our State so much money and we can ease up some of the congestion when the construction is going on? Mr. Ray, maybe you could help me with that.

Mr. RAY. Absolutely. Thank you for the question, Congresswoman. It is obviously a problem that we hear across America, the timeliness with which projects are completed. It is a significant problem. I think that the innovative contracting mechanisms that we are talking about here today will do a lot to help. Right now I believe a lot of State DOTs are still beginning to just stick their toe in the water to see what types of mechanisms they like, how they might like to deploy those. It is going to take a little bit of time for the State DOTs to become adept at these types of contracting mechanisms, and where we will really start to see the efficiencies, I think, is downstream.

With regard to both of our SEP programs, I would encourage you to encourage your State DOT and your municipalities to apply for those. Bring ideas to us. I think for us to be able to bring ideas to you, of course, we can think critically about our own program. But it is immensely more valuable for someone who is actually implementing it and living with the issues day in and day out, to bring those issues to us and say, we would like to experiment with the following. And if we experiment with it and it has benefit, then you are going to find us in front of you making requests.

The last thing I would say is the Secretary does have the authority to place projects on the executive order for environmental streamlining. I want to be clear: that does not cut any corners with regard to any of our environmental requirements in statute or otherwise. But what it does is, as so often is the case, disputes will arise, even inter-agency, us and Fish and Wildlife or us and EPA. What the environmental streamlining executive order does is it elevates those decision points very quickly. It identifies a log jam and it elevates it up the chain very quickly. I can tell you, Secretary Peters cares very much about this program. She is willing to spend time on it herself. I think you will see that that program helps move projects along quite a bit as well.

Ms. FALLIN. Mr. Chairman, I am glad to hear that you are trying to get the agencies to work together, because it sure can cause some delays when you are trying to sort through several different projects.

Also, I have always thought that the States are good laboratories for innovative ideas for partnerships. Do you have any way of disseminating information to the various States, when you find some-

thing that is successful? I know we have heard some great examples here today. But is there any way to get that information back to the individual States?

Mr. RAY. Absolutely. We actually publish reports fairly regularly, and that of course goes out to the field. We also share the information with various experiments with our division administrators, which we have in every State. They should be communicating those to the State DOTs.

Lastly, I think as a multitude of us go out and speak at various conferences, we are constantly highlighting new ideas and new concepts that are out there. It is not just in project delivery, though. I should mention, I guess, nearly a year ago when we had the ceiling collapse in the Central Artery Tunnel, we immediately started looking at the epoxy bolts that were holding that system up and immediately did a canvass of all the State facilities to see who else might be utilizing this technology and making sure that they did proper inspections, just to make sure that we are protecting the public as best we can.

Ms. FALLIN. Okay, thank you. Mr. Chairman, I yield back my time.

Mr. DEFAZIO. I thank the gentlewoman.

Mr. Ray, when we had your colleague, Mr. Duvall, in for a hearing on the subject, and similar to what Mrs. Napolitano raised, we found a number of problems with either gullibility or States that were in a big hurry, like Indiana, in terms of the agreements they entered into, and some jeopardy to the public interest, or loss of revenue or other problems. As we heard in the case of S.R. 91, basically, we ended up with almost triple the cost because of a non-compete agreement which became a safety issue with a conflict in interpretation of the contract, and then the State had to buy out the project.

We raised a number of those issues from members on both sides during that hearing, and Mr. Duvall said that DOT was going to put up some guidance on sort of the common pitfalls and problems. You just said, States are becoming much better at detecting these problems beforehand. Well, I think guidance, with the overview of the Federal Government, to the 50 State and territory perspective would be really helpful. Staff tells me on their most recent visit to the web site, where there is still the paean to the wonders of public-private partnerships, there is still no guidance or cautions. I would hope that is going to be forthcoming soon.

Mr. RAY. Congressman, I appreciate your raising that point. I thought that we might talk about it today. I assure you we are working very diligently on that product. I think it is reasonable to think that we will have that out, maybe even within the month. I think certainly no longer than a month and a half.

What you will see is a section by section analysis of the model legislation that we produced. Embedded in that will be commentary identifying various risks as we see them. Once that product is out, I think we will see what the response is, and begin looking at what other mechanisms we might be able to use to both identify and educate people, interested parties on those risks.

Mr. DEFAZIO. Excellent. We will look forward to that work product.

Back to the NEPA question, I am still a little confused. We did essentially modify, and this was particularly Chairman Oberstar, then Ranking Member Oberstar, be put a tremendous amount of time into negotiating that section of SAFETEA-LU, and ultimately after initial extraordinary resistance from environmental groups, brought them around and made some modifications. We did give you the authority to promulgate new rules to implement those provisions, which could streamline NEPA and other associated environmental reviews.

I think I sort of asked this but perhaps not explicitly. When can we expect the rulemaking, the legislation was passed now, oh, August of 2005. So it is not quite two years.

Mr. RAY. Congressman, thank you. I didn't have this data in front of me earlier, and I would be happy to actually leave this sheet with you. It is actually a table with all the activities mandated by SAFETEA-LU and what the status is. Certainly I think there is quite a bit of guidance that is out there. There is also the NPRM on the five-State pilot project, which we discussed earlier. We are making progress, and we are moving through the list that you gave us absolutely as quickly as we possibly can.

[Information follows:]

P. 53 Line 1228

Enclosure 1: SAFETEA-LU Guidance, Regulations & Other Implementation Items Related to Environmental Process - As of 4/18/07

S-LU Section	Date	Title	Format	URL
6002	12/1/05	Interim Guidance on the Use of 23 USC §139(1) Limitation on Claims Notices [Incorporated into Final Guidance issued on 11/15/06.]	Joint HCC/HEP memo sent via 12/2/05 email from Cindy Burbank	http://www.fhwa.dot.gov/hep/intgui_limclms.htm
	6/29/06	Notice of Availability of Proposed Guidance on Section 6002 of SAFETEA-LU and Request for Comments [See Final Guidance issued on 11/15/06.]	Joint FHWA/FTA FR notice	http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/pdf/E6-10217.pdf
	11/15/06	Environmental Review Process Final Guidance	Joint FHWA/FTA FR notice and Internet guidance	Federal Register Notice; Final Guidance
6004	4/4/06	Guidance on the State Assumption of Responsibility for Categorical Exclusions	Memo to field from Fred Skaer	http://www.fhwa.dot.gov/hep/6004memo.htm
6005	4/5/06	Transportation Project Delivery Pilot Program; Notice of proposed rulemaking (NPRM); request for comments [See Final Rule published on 2/12/07.]	Federal Register Notice	http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/E6-4911.htm
	2/12/07	Transportation Project Delivery Pilot Program; Final Rule	Federal Register Notice	http://a257.g.akamaitech.net/7/257/2422/01jan20071800/edocket.access.gpo.gov/2007/E7-2375.htm
6007	1/13/06	Guidance for Applying the 4(f) Exemption for the Interstate Highway System [See final list published on 12/19/06.]	Memo from Cindy Burbank	http://www.fhwa.dot.gov/hep/interstate4f.htm
	6/16/06	Preliminary List of Nationally and Exceptionally Significant Features of the Federal Interstate Highway System [See final list published on 12/19/06.]	FR Notice	http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/pdf/E6-9454.pdf
	12/19/06	Final List of Nationally and Exceptionally Significant Features of the Federal Interstate Highway System	FR Notice	http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/pdf/E6-21581.pdf
	12/19/06	Final List of Nationally and Exceptionally Significant Features of the Federal Interstate Highway System	List	http://www.environment.fhwa.dot.gov/histpres/highways_list.asp
6009	12/13/05	Guidance for Determining *De Minimis* Impacts to Section 4(f) Resources	Joint FHWA/FTA memo sent via 12/14/05 email from Fred Skaer	http://www.fhwa.dot.gov/hep/guidedeminimis.htm
	7/27/06	Parks, Recreation Areas, Wildlife and Waterfowl Refuges, and Historic Sites; Notice of proposed rulemaking (NPRM); request for comments.	Federal Register Notice	http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/pdf/06-6496.pdf
	Projected Sept. 2007	Parks, Recreation Areas, Wildlife and Waterfowl Refuges, and Historic Sites; Final Rule	Federal Register Notice	
6010	11/06-Present	Obtain sample of ITS-related projects that were Categorically Excluded or found to have Finding of No Significant Impacts. Developed a Programmatic Agreement in consultation with the Advisory Council of Historic Preservation. Initiated consultation with the Council on Environmental Quality		
	Projected June 2007	Rulemaking for ITS projects to proceed as Categorically Excluded. Incorporated statutory language into 23 CFR 771.117 revisions.	Federal Register Notice of proposed minor rulemaking	
6011	2/14/06	Interim Guidance for Implementing the Transportation Conformity Provisions in SAFETEA-LU	Joint EPA, FHWA, FTA memo	http://www.fhwa.dot.gov/environment/conformity/sec6011guidmemo.htm

Resources:

Environmental Review Process Toolkit: http://environment.fhwa.dot.gov/strmlng/es2safetealu.asp

ReNEPA SAFETEA-LU Discussion Site: http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/home?OpenForm&Group=SAFETEA-LU&Collapse=

But there is a fair amount of guidance out there, and certainly we are in the rulemaking process. Some of them are at NPRM stage and we are looking at comments and some are at various stages of the rulemaking process. But I assure you, we appreciated the flexibility that you are affording the States, and we are working diligently to implement that.

Mr. DEFAZIO. Okay. We will look forward to seeing that list and helping you expedite the process.

Now, Mr. Horner, on our exchange about congestion pricing, and you mentioned London, and I was a bit—I want to get some clarification there. My understanding of the system in London is in fact they do have very extraordinary, which would probably not be tolerated here, pricing, as I believe they do in the old parts of Rome, to basically prohibit or price out passenger cars, except for the limos of the rich. They, as I understand it, in London, apply much of the revenue gained there, over to their transit system. And they don't charge a congestion charge on their transit system. That is the point I was trying to make, if you are going to price people off of the public highways, which I don't agree with, but if we are going to do that, then we would need to perhaps divert some of those revenues, not have those revenues taken as profits by the private sector as I understand will pretty much happen in Virginia, although there is some little recapture there, but have that money reinvested to facilitate the movement of people who were driven off the highways. That's what London does. Do you have a different understanding of what they are doing there? Because you are talking about both congestion pricing in transit and on roads. They have adopted it very strictly on roads, and they are applying it to facilitate transit. You are from the transit folks. You would hope they are going to facilitate transit.

Mr. HORNER. I am pausing to understand your question.

Mr. DEFAZIO. Well, the question is pretty simple. The point is simple. I don't support congestion pricing on transit when we are trying to have a societal goal of getting people off roads. You have included it in your criteria here, and you are implying that that is what is going on in London. Do you have a different understanding of what is going on in London? They have very high congestion pricing for autos. But they don't, to the best of staff's knowledge or my knowledge, have any on transit. You are proposing a new novel model where you would have both. Are you aware of that, anybody who is doing both at the same time?

Mr. HORNER. Mr. Chairman, thank you for that question. If I may rephrase, are you asking whether we endorse congestion charging of transit vehicles that would travel in corridors——

Mr. DEFAZIO. Well, of passengers on transit, yes. That is what your guidance here says, unless I misunderstand, whether the project, and you are talking about transit, is part of a congestion mitigation plan that incorporates system-wide congestion pricing. Unless you are referring to other modes as a system, I assume that system went to the transit mode.

Mr. HORNER. By system, reference to system-wide is a reference to a geographic area.

Mr. DEFAZIO. You ought to clarify that, so other people won't get confused. I am a very simple guy, but other people might get con-

fused too. System to me, since we are talking about transit, I think of transit systems. I don't think of transportation system as everything inside the beltway in Washington, D.C. for instance.

Okay, well, I am glad we got that clarified. That is good.

Here is another, I find sort of internal contradiction, FHWA has said, and I want to know if FTA is in accordance with this, that local governments and transit agencies have in part used CMAQ funds for start-up operations. I mean, there is, we are talking about risk with new transit operations. Obviously there is a build-up phase.

But the FHWA has decided to eliminate that authority, and some of the CMAQ funds are now going unspent. I am curious, does the FTA support, again, since we are talking about these congestion issues and trying to get people to use the modes more efficiently, does the FTA support the prohibition on the use of CMAQ funds for start-up on new transit projects, new starts?

Mr. HORNER. Mr. Chairman, thank you for that question. The policy to which you are referring is a proposed policy, published I think in the form of guidance by FHWA recently. The public comment period on that guidance closed recently. FTA and FHWA are digesting the comments from the public and determining what final position to take on that question.

Mr. DEFAZIO. Well, are you in accord, is the FTA in accord with FHWA here or are you having a little internal and quiet conflict over this?

Mr. HORNER. To my knowledge, there is no conflict internally.

Mr. DEFAZIO. But you support this. The transit folks support prohibiting the use of CMAQ funds for start-up of new start transit projects. The transit people support what FHWA is doing. So where are you going to get the money to help these folks? Or is this an attempt to try and drive that privatized investment in the hope that if we can't have public help, we will get private help?

Mr. HORNER. Thank you for that question, Mr. Chairman. As I understand the guidance, it is a proposal and does not reflect the definitive view of FHWA. In publishing any guidance for public comment, we are obliged by law to take into account comments that we receive.

Mr. DEFAZIO. But it is not their opinion? They just sort of put this proposal out there to prohibit the use of CMAQ funds just for yucks to see what the public thinks? That is not the policy of the Administration or the FHWA, to prohibit the use of that? They aren't proposing that in the rule and therefore asking for comment on their proposal to prohibit it? I mean, you just said that it was just sort of out there.

Mr. HORNER. Thank you, Mr. Chairman, for that question. It is a proposal, but it is not definitive.

Mr. DEFAZIO. And you think, given your other concerns about congestion, that this would be a good idea, this will be a step forward for the United States, to say that you can't use CMAQ funds to help in the first few years of operation of a new transit project? That is going to help us get new investment, new transit and mitigate congestion somehow? How is that going to help?

Mr. HORNER. This is the very debate that we expect to have internally. You raise a very good policy question, Mr. Chairman. It

is a point that has been made on the docket, also. We would take into account in a meaningful way points of the sort that you are making now.

Mr. DEFAZIO. Okay. Well, Mr. Hansen, since you operate a transit system, do you have any comment on that?

Mr. HANSEN. We believe that the current procedures are appropriate, that is, that the Federal Transit Administration is the sole entity that ought to make the call on the proper use of CMAQ funding. We clearly believe that CMAQ funding is flexible funding to be able to assist in air quality mitigation, its very name, and should be utilized to be able to further transit, including start-up and planning for those transit uses.

Mr. DEFAZIO. Have you commented?

Mr. HANSEN. We as a region I believe did JPAC, our normal JPAC process. I believe we did.

Mr. DEFAZIO. Then perhaps we will hear from the Chairman on this, I believe the Committee would be, at least some of us on the Committee would be very concerned if that proposal went any further, other than a blue sky proposal out there. I don't understand the objective on how these things are internally consistent.

A couple more quick questions. And I think there is an interesting point between Mr. Njord and Mr. Hansen. Mr. Hansen talked about how you had a long-term plan and you received an unsolicited proposal. But it fit in your plan.

Mr. HANSEN. Yes.

Mr. DEFAZIO. All right. I think that is kind of key. Now, Mr. Njord, as I understand the new Utah PPP legislation, you will receive unsolicited proposals. This is one of the concerns many transportation planners have, since, if people are looking around to cherry pick something, they are not going to look for something that necessarily meets the greatest public need, but it perhaps is the most lucrative. How are you going to fit these unsolicited proposals into your plan? Are they going to trump the plan? In this case, we had an unsolicited proposal that was consistent with the plan. What happens when you get one that is not consistent with your plan?

Mr. NJORD. Mr. Chairman, we are in the process of writing the rules on how unsolicited proposals would be received in the State of Utah. It is our anticipation that projects that are outside of our long range plan would be considered, but they would not be forwarded until a change in the long range plan had occurred. So it doesn't trump.

Mr. DEFAZIO. Okay, that is good. I think some other States are struggling with that issue.

I was puzzled by one thing, the CMGC. I don't understand why that would require SEP exception, why having a CMGC would require any sort of exception. It seems to me like it could be something that would be done under existing law. Why do you think you need an exception? Mr. Hansen seems to have a comment on that, too.

Mr. NJORD. I agree with you, Mr. Chairman. However, for us to proceed, we do need to have that exception.

Mr. DEFAZIO. From the Feds or in the State?

Mr. NJORD. From the Feds.

Mr. DEFAZIO. You do? Okay. I am puzzled. Mr. Hansen, did you have a comment on that?

Mr. HANSEN. I do, Mr. Chairman. Within Oregon, the public contracting requirements are that, my board of directors and my board president, George Passadore, is here today. They are in fact authorized as a public contract review board to be able to exempt certain contracts from the low bid requirements. They must make findings that are subject to public hearing. It is a very public and transparent process, whether that entity is able to do it without additional requirements, to be able to achieve that end.

Now, any Federal project under the FTA, obviously we must fully comply with FTA requirements. We inform them of those processes. But I am not aware of any specific exemption that is required under what you were just referring to.

Mr. DEFAZIO. Mr. Ray, do you believe that you have to get an exemption just to use the CMGC? I just don't understand what in present law prohibits that.

Mr. RAY. Congressman, I believe the prohibition is actually found in the way that the contract is actually awarded. The method that you are talking about actually looks at best value as the mechanism to select the winning bidder versus low bid. And of course, outside of SEP-15, low bid is the traditional mechanism, is the prevailing and mandatory way to select contractors.

Mr. DEFAZIO. Okay, maybe I don't fully understand the CMGC concept as presented by Mr. Njord. But my thinking was that this was essentially someone who was at the front end of the project and helps you deal with these issues as you enter into it, as opposed to someone who is—yes, Mr. Njord?

Mr. NJORD. Under CMGC, you hire a contractor, not knowing what you are going to pay for the contract.

Mr. DEFAZIO. Right.

Mr. NJORD. So he helps you, when you marry him with this designer, you go through the design phase, he is providing input into that design phase. Then at the end of the process, you lock in a price.

Mr. DEFAZIO. Right.

Mr. NJORD. And it is, when we——

Mr. DEFAZIO. But that is like having, you are essentially hiring someone, you are going to do design-build, is that what you are describing, but you are hiring someone else to sort of oversee the development of the design-build?

Mr. NJORD. That is correct. And you allow them to have input early on in the process that will reduce cost.

Mr. DEFAZIO. Right. So that is why it seems to me this would be protecting the public interest, if you are going to do design-build, having the CMGC gives you some higher level of assurance of the public interest and/or the value price that is protected. I don't understand why if you are going to allow the design-build routinely, which Mr. Ray says you do now, I mean, you could just do a design-build, they don't even review it, why would they have to review that you want to hire CMGC to oversee the development of the design-build? Why would you do that? If you are exempting design-builds, why not allow people to have CMGCs to help them get a better value?

Mr. RAY. Congressman, I think the roots of it are found in what Mr. Njord was actually referring to earlier in the way that this contractor is brought in at a very early stage to work on that. But what I would like to do, sir, just because I have to admit, I am not terribly familiar with the contracting——

Mr. DEFAZIO. Sure, that would be fine, get back to us.

[Information follows:]

P. 63
Line 1478

WHAT ARE THE ROLES OF DESIGN-BUILD AND CONSTRUCTION MANAGER / GENERAL CONTRACTOR IN SEP-14

QUESTION: What are the roles of design-build project delivery method and the Construction Manager / General Contractor (CMGC) project delivery method in the Federal-aid highway program? (DeFazio)

ANSWER:

- The FHWA allowed the States to evaluate the design-build project delivery method under Special Experimental Project No. 14 – Innovative Contracting from 1990 to 2002. During this time period the states evaluate more than 300 design-build projects. The FHWA's December 10, 2002 final rule implemented a TEA-21 provision that reduced the threshold limitation for SEP-14 design-build. This limitation was then eliminated by SAFETA-Lu Section 1503. With the FHWA's final rule making implementing Section 1503 (currently pending), the State DOTs will be free to use design-build on any Federal-aid highway project without experimental evaluation. While the use of design-build has grown significantly in the US, it is estimated that the number of design-build projects still constitutes less than 1% of the total number of highway contracts, but because of the large size of some design-build contracts, it constitutes about 5% of the total contract amount.

- In contrast to the design-build project delivery method where design and construction services are combined in one contract, the CMGC project delivery method allows the contracting agency to advance the design of a project while receiving construction expertise from an independent firm. The CMGC firm is usually procured on the basis of past experience and qualifications. A separate price is negotiated for preconstruction services which include: life-cycle cost design considerations, value engineering, scheduling, cost estimating, constructability, alternative construction options for cost savings, and sequencing of work. During the final stages of design, the contracting agency may negotiate with the CMGC firm to obtain a price for construction. If successful, the CMGC then becomes the prime construction contractor. If the contracting agency is not able to agree on a reasonable price, it still has the option of proceeding with a traditional low-bid construction contract. The CMGC method is common in the vertical building industry but relatively rare in the highway industry. Washington State DOT received SEP-14 approval to use CMGC on the Anacortes Marine Terminal project in 2004.

- A few local public agencies in Arizona have received SEP-14 approval to advance several projects under a very similar procedure call construction manager at risk.

Mr. DEFAZIO. But I am just pointing out, you said earlier that the design-build is now considered routine, doesn't require individual review. But in order to get someone to sort of protect you as you go into a design-build, which is what I consider these positions as I understand them to be, you have to get special permission. That seems odd. And I mean, if you are going to allow the design-build routinely, they ought to be able to do it with this sort of additional monitoring.

My time has expired. Mr. Duncan?

Mr. DUNCAN. Mr. Horner, just going back very briefly to something, the FTA does not advocate congestion pricing for transit services, does it?

Mr. HORNER. No, sir.

Mr. DUNCAN. Thank you very much.

Mr. DEFAZIO. Yes, I think you need to, your little pilot language there, you really need to tighten up that language, because it sure appears that way.

Mr. HORNER. Yes, sir, I shall.

Mr. DEFAZIO. So with that, I would see if the Chairman has questions.

Mr. OBERSTAR. Thank you, Mr. Chairman.

I think you and Mr. Duncan have been doing a fine job, and the other members of the Committee, asking very sharp, pointed questions. We are getting good, informative answers.

Mr. Ray, I have a question, though, about the so-called innovative contracting techniques that go back to ISTEA and the autohrity that we created in ISTEA to develop innovative technologies and approaches to delivering highway projects faster. One of the issues that we have grappled with over many years in this Committee is that of warranty. European highway construction practice is to in effect say to the contractor, we want a three layer chocolate cake, we want it delivered on such and such date, you build it. We want it to last 75 years, and this is what we are willing to pay for it.

So the contractor goes out and builds that project and then has to bond and also get insurance in order to cover himself in case his approach fails. It is a practice of shifting the responsibility onto the contractor, not onto the State. Our procedure is in securing that three-layer chocolate cake as to specify exactly all the ingredients, the time it will take to do it, the type of materials, ingredients to go into that cake and then to supervise it every inch of the way.

What did you do, not you individually, Federal Highway Administration approve in the warranty? It seems to be a much more limited warranty in your final rule of 1996. And what do you envision as a next or future step for warranty?

Mr. RAY. Congressman, I think that you actually articulated very clearly, warranties are really meant for those things that the contractor or the designer have flexibility in controlling. If we specify the exact mix that may be there, then certainly we or the State DOT should be responsible if that mix turns out to not meet the life cycle that we would like for it to.

But certainly in circumstances where we are affording greater flexibility to the contractor, and they are developing the innovations or the methodology that they will use to deliver the project

according to our general specifications, then we do think that some warranties are appropriate. Now, of course, there is a general prohibition on Federal aid funds being spent to maintain the facility. That is really the friction or the tension between wanting to advance warranties and of course, complying with the spirit of our program, where we are not paying for maintenance in a long-term framework.

In terms of the next steps——

Mr. OBERSTAR. The part of my question that I wanted you to answer is, warranty in the Federal Highway Administration rulemaking, in operation today, is very limited. It is not, in the European sense of, that they do in France, Belgium or Germany or the Netherlands, of building the entire roadway, but limited aspects thereof, is that correct?

Mr. RAY. Sir, you are absolutely right. The Europeans are using a performance-based warranty mechanism. That is not where we are.

Mr. OBERSTAR. Have you evaluated the European experience against U.S. experience?

Mr. RAY. I know we have certainly looked at it. To what extent, I would have to get back to you on the record whether or not we have actually drafted a report or created any real data.

[Information follows:]

P. 66
Line 1560

EUORPEAN USE OF WARRANTIES

QUESTION: Has FHWA issued a report comparing the use of warranties in the US versus the use in Europe ? (Mr. Oberstar)

ANSWER:

- Yes, a report titled: "Asphalt Pavement Warranties Technology and Practice in Europe" (http://international.fhwa.dot.gov/apw/index.htm) documented the findings of an Scan Team who visited several European countries in September 2002. The Scan Team included representatives from FHWA, AASHTO, local public agencies, industry and academia.

- In general terms, the report concludes that:

    - Several European countries believe that their long history of warranty application has improved the performance of their highway system,
    - Their use of warranty provisions continues to evolve through a customer-focused partnership between government and industry,
    - The use of best-value procurement and prequalification procedures are essential elements of any warranty system,
    - Material and workmanship warranties are in use on all short-term warranties, and
    - Long-term performance warranties include design, construction, and some type of planned maintenance.

- By contrast, the use of warranties by the AASHTO members has been principally limited to a number of states that have elected to use pavement warranties, or have been required to use warranties by their state legislatures. Chapter two in the "Asphalt Pavement Warranties Technology and Practice in Europe" report (http://international.fhwa.dot.gov/apw/chapter2.htm) documents the usage of warranties in Europe and provides a comparison with the US usage.

S:\HIPA-30\BRIEFING\Q&A followup innove contractingt european warranty use 4 25 2007.doc
5/17/2007 10:38 AM

Mr. RAY. But I know certainly we have looked at what the Europeans are doing in this respect, and of course, in a variety of others. And you are absolutely right, that is not where we are right now. But I think we do believe that innovative contracting holds promise for expansion of warranty in the future. And of course, as you mentioned, that is not where our current rulemaking is. The limitations there, I think, are really based on the tension or friction that I mentioned earlier. Our desire to not pay for long-term maintenance compared to the——

Mr. OBERSTAR. Yes, that is not my question, nor should we get into long-term maintenance. But we do have an interstate maintenance provision.

Mr. Secretary of Transportation Njord, what is your thought about, do you see any advantage in the warranty approach over our very prescriptive, long-term practice, prescriptive approach to highway construction?

Mr. NJORD. Chairman Oberstar, thank you for that question. It is good to see you again.

This issue that you brought up is a very, very powerful issue in the contracting world, warranties. We have talked about this a little bit here today, but on a standard project, a contractor warrants that project for a year, from the time it is completed until a year after, he warrants his work.

Longer term warranties, as you have mentioned, are gaining speed. We have experimented with them in my own State and I know of other States that have also experimented with warranties. On the project that I talked about earlier, the I-15 project, we had a ten-year warranty clause within the contract. And we had the option to exercise that clause of the contract up to six months before the end of the project.

So in reality, this contractor built the project thinking that we would exercise that option and he would have to warranty that work for ten years. As it turns out, the project was done with exceptional quality, and we determined that it was unnecessary to exercise that warranty option. But by that time, the job was done. All the work was done, the ingredients to the cake were all in place, and they had been inspected. He was thinking that he was going to have to warranty this thing for a very long time.

So it is a very powerful idea and it is something that we need to explore even further. Design-build, CMGC, both of these contracting methodologies enable warranties to work. Because under both of these types of project delivery methods, we do not specify how to build the cake. We allow them to design that.

Mr. OBERSTAR. Do you get a product earlier? Do you get it with fewer delays? Do you still have to go through the permitting, the contractor still has to go through the permitting process and gain all the permits necessary to do the building?

Mr. NJORD. Of course. All the permitting has to take place prior to the construction, regardless of how the project delivery method occurs.

Mr. OBERSTAR. Mr. Hansen, in transit, is warranty an applicable strategy?

Mr. HANSEN. I wanted to spend time, Mr. Chairman Oberstar, about that. As you know, in the Portland area, we have had very, very good luck with our systems. We obviously require——

Mr. OBERSTAR. Not good luck. You guys have built a great system out there. And when you do something well, it is not luck. It is because it was done by design.

Mr. HANSEN. We believe it was, and we continue to be able to do that.

Our requirements are the normal requirements for any kind of contracting, that before it is turned over to us, we have our normal punch list, we go through all the quality issues. Certainly if there is anything that is even after that turnover in the project that was a failure on the part of the contractor, it is something that we expect that contractor to be a part of the solution when we go back on that issue.

But I do want to make clear that I think there are differences between the design-build elements and some of the other contracting methods that are very, very important. In certain areas, the design-build works very well. When you do have an area that isn't subject to many changes, because change orders are the real price killer in design-build. In our most recent project, I think you were out actually seeing it, our yellow line, Interstate MAX line, two-thirds of it was going through a neighborhood in the middle of a street. We knew that CMGC-type contract was the type of method we should be utilizing for that. Because the inevitability of change orders and how to do an intersection and what about a business that needed a special treatment was there.

The last third, however, was really over an industrial area, much of it elevated structure. That was very appropriate for design-build and we did it by design-build. Again, I think the structure needs to be looking at the particular facility that is there, what needs to be done to address the type of contracting.

Mr. OBERSTAR. Thank you.

In all of this, moving to a warranty approach would be a dramatic shift in the way we carry out the Federal-Aid Highway program. It might in fact mean dissolution of the AASHTO manual. It might result in different standards in each State. It would be a great departure from the success we have had in this Country. But also, we have to be open to ways in which we can close the gap of time consumed in constructing projects.

One last question that is not related to the subject matter at hand, Mr. Chairman, and that is, in SAFETEA, we included streamlining language to speed up the processing of highway construction projects, bridge projects and transit, that was intended to compress the time but not circumvent any of the existing laws. I wonder, Mr. Ray, if you have had any experience with any of the States that have actually used, we envisioned it would be used mainly for major projects. But of course that applies to any construction project.

Mr. RAY. Mr. Chairman, thank you for the question. Absolutely, you did provide us with a great deal of flexibilities in SAFETEA-LU. We are excited about some of those. Chairman DeFazio and I chatted about a few of those just a little while ago and what the

status was of some of those. We are going to leave some documentation as to where we are.

As to specific examples of that, I am afraid I don't have any data at my fingertips. But I would be happy to respond on the record for you with some narratives on maybe some of the best cases out there.

Mr. OBERSTAR. I would very much appreciate that, because that was, I spent an awful lot of time on that myself with Chairman Young and all the various players. I think we put together a very good process for compressing the time frame, still keeping all the voices intact and attending to all the needs.

Thank you, Mr. Chairman.

Mr. DEFAZIO. We already gave the Chairman ample credit on that issue earlier. I raised the question and we do look forward to seeing your work implemented. I pointed out how it was difficult in particular to bring the environmental groups to the table on that issue, and you did yeoman's work.

Mr. Baird has not had a chance to ask questions, so I would go to Mr. Baird.

Mr. BAIRD. I thank the Chairman.

I don't know if our witnesses have had a chance to look at it, but a little bit later, in the second panel, we are going to hear some rather interesting testimony from Bruce Blanning, with the Professional Engineers in California. I guess he has a surrogate speaking. But his quote is pretty interesting: "Design-build and similar methods are procedures which shouldn't work in theory and haven't worked in practice. Using design-build under a public-private partnership only makes the problem worse, because due to private funding and the involvement by the public agency in the process is typically even less."

Any comments on that? We will hear from him directly, or at least his surrogate and then others. Any comments from your own experience?

Mr. RAY. I would like to comment on it briefly and I imagine my fellow panelist Mr. Njord may have a few comments on that as well. I think we at FHWA and we in the Department of Transportation believe that design-build and other innovative contracting mechanisms have a tremendous amount of opportunity. One of the issues that may be preventing or hindering, rather, some of the efficiencies gained is actually just experience with the model.

I think that is both on the contracting side, the private side, contractors being familiar with the bid process, what is expected of them, the additional responsibilities that will be layered on them going forward, and also with, on the State DOTs and their being required to have a very clear understanding of exactly what the project needs to look like, what their performance specifications will be early in the process, rather than kind of on an ongoing basis.

I think that Utah Department of Transportation is really probably one of the best cases out there, as examples of how design-build can work and what efficiencies it should deliver. I would be happy to walk through those with you, but I think it is actually more appropriate for Mr. Njord to walk through those.

Mr. BAIRD. Let me follow up just briefly, though, with you, Mr. Ray. I am a little circumspect because the Administration believes that the solution to Medicare's woes was managed care. Empirical data suggests that the managed care system has dramatically increased costs and the Administration's proposal to solve that is to increase funding for managed care to prove that it works. I don't know if Mr. Blanning is correct, I don't have the expertise.

But just to say we believe something, Mr. Blanning at least seems to cite some evidence that there are cost overruns or high bidding initially and that there are significant quality problems inherent and just implicit in the structure of a design-build model.

Mr. RAY. Well, again, I think on design-build, time will tell. We will get a lot more data on this as we move forward in the process. We submitted a report to Congress in 2006 with findings that to be quite honest, were a bit mixed. I attribute those largely to our inexperience in the marketplace here. I think we will become more proficient over time.

But our report absolutely showed a time savings. It showed that the quality was on par. The cost savings, our data was mixed. I think there are numerous reports out there that show that there are tremendous cost savings. One note on the report to us, and I would be happy to get a copy up to you, the cost savings there did not take into account the time savings. Of course, in today's world, time is money. So we didn't attribute an actual value to that. But it is kind of an interesting narrative on the report generally.

Mr. BAIRD. Thank you.

Mr. Njord, as a graduate of the University of Utah, welcome, and also to my good friend, Mr. Hansen. Thank you for being here.

Mr. Njord, you have some experience with this.

Mr. NJORD. I think that our real-life experience is contradictory to what you have just read. We have had tremendous success with design-build, accelerating the project from ten years plus to four and a half years. Mr. Ray talked about the cost savings to people. We had a study commissioned by the University of Utah, actually——

Mr. BAIRD. Must be good, then.

Mr. NJORD. Must be accurate. That study concluded that there was $500 million saved by the traveling public just because of the accelerated process of not having to deal with that project for ten years. So I think, concerning quality, if we had a quality problem on this very large design-build project, it is six years old now. Don't you think we would have found it by now?

There are no quality problems. This project is going to last us for decades into the future.

Mr. BAIRD. Is that inherent in the nature of design-build, or was it a consequence of the quality of the construction companies involved and your agency's oversight? My experience in life is it comes down to the people. Some systems allow more flexibility and bad actors, I think it might be hard to suggest the Big Dig and some other things have been exemplars of effective models. Do you think it was more your agency's oversight and quality contractors? Or was it some other entity doing the work?

Mr. NJORD. Obviously we had a very professional contractor that did the work for us. If you, this is a misnomer that many people

have, that somehow you can inspect quality into a job. It is impossible. If you don't have the person performing the work in a quality fashion, it will not be quality work. You cannot inspect quality into a project. It has to be done by the workers.

Mr. BAIRD. Could you un-inspect a lack of quality into the project? Meaning, could the lack of inspection contribute to a poor quality?

Mr. NJORD. What you have to do is transfer the risk. If you want to inspect every nook and cranny of every project, you will transfer the risk for that failure to yourself. If you transfer the risk to the contractor, then it is his risk.

Mr. BAIRD. Through a warranty.

Mr. NJORD. Through a warranty.

Mr. BAIRD. In other words, part of what we may be hitting at here is that while you are referring to design-build, you really mean design-build plus warranty contributed to the outcome.

Mr. NJORD. In other words, I don't necessarily know that your example would say design-build per se sans inspections works, but design-build plus warranty may be a greater key.

Mr. Hansen?

Mr. HANSEN. Just a couple of quick comments, Mr. Chairman, Congressman Baird.

As you know, the airport light rail, which is what I was speaking to here, was a very successful design-build. But it was successful for several reasons. One was, there was first a real clarity as to exactly what was to be built, that the opportunity for change order was very, very limited. The ability to be able to have it determined up front was there.

Number two, the risk that was being assumed by Bechtel was very clear as well. That risk was around the development at Cascade Station, an area I know you are well aware of, with the new IKEA store going in. That was a risk they assumed, not the risk on the contribution to the building of the light rail or ultimately its performance. That was the normal contracting process under design-build.

Lastly, you do need to have both a sophisticated owner, in this case TriMet, but also a contractor, which we clearly had within Bechtel.

Mr. BAIRD. Thank you. Thank you, Mr. Chairman.

Mr. DEFAZIO. Thank you. Ms. Napolitano had another question, did you not?

Mrs. NAPOLITANO. Yes, thank you.

First of all, I just wanted to say to Mr. Ray that I was very grateful to Secretary Peters, in her travel last month to California to oversee the issue of transportation impact, the congestion California highways have in southern California. She is very well versed and understood all the issues, as she already knew quite a few of them.

In that, we were talking, you were referring to the CMGC and the issues there, about incentives. When 105 was built in California, the incentives to that contractor were, build it on time, you get a bonus. You build it ahead of time, you get an additional bonus. Guess what? He built it ahead of time.

However, there was an issue with some area which apparently began to sag and they had to go and do some repair work. So if you do not have a warranty or if you have a warranty that is limited, who then is responsible? Because these projects are supposed to last, not just one, two, three decades, but hopefully five, six decades or more.

Now, how long can some of this go into the warranty and the protection if the company is no longer there to be able to take care of that? Gentlemen?

Mr. RAY. I would like to take the first crack at that. Congresswoman, I appreciate the question. I will definitely mention your comments about the Secretary to her when I see her next. I know she would appreciate that and cares very deeply about California.

With regard to the warranties, I should have mentioned this earlier, the design-build rule, which of course we are making some changes, the NPRM is out. We have the comments, we have looked at those, and we hope to have a final rule out this summer. We will make some changes to warranties to allow greater use of those through design-build contracts. And of course, I have already expressed our general interest in advancing warranties as a mechanism available to State DOTs.

I would also like to mention that with design-build and also with P3s, and when I say P3s, what I am actually speaking about here, because I think there is a broad array, a broad definition of what P3s can encompass, but the concession deals that we see, these long-term concession deals. This is a way of shifting the risk, of maintaining the facility over long periods of time to the private sector, where that burden doesn't come back if there is a mistake in contracting. I am not saying that that is not without its risk. It obviously has other issues that have to be considered by State DOT and by the public. But it is a benefit that should be understood.

Mrs. NAPOLITANO. That doesn't answer my question, sir. I am asking whose responsibility, who would come in then and do. Is it back on the taxpayer?

Mr. RAY. Ma'am, absolutely. I think that once the warranty has expired, the owner of the facility is responsible. If there is no warranty, as is the case with a traditional design-bid-build facility, then once you have accepted the product, once you have accepted the facility, short of a proving of negligence or fraud or some other malfeasance, then I think absolutely the owner of the facility would be the responsible entity.

Mrs. NAPOLITANO. Secretary Peters also was with us in Long Beach area, where one of the bridges, pieces of concrete are falling off that bridge.

Mr. RAY. She mentioned this to us, absolutely.

Mrs. NAPOLITANO. And?

Mr. RAY. As to who would be responsible for that, I am afraid I don't know about the facility and I don't know how that facility was built, how it is operated or managed. So I would have to get back to you on the record as to the specifics of that incident.

Mrs. NAPOLITANO. I am not particularly interested in that, but I am using that as an example of things that can happen that then fall back on the owner or the taxpayer to put funding to be able to rebuild or to repair.

Mr. RAY. Absolutely, I see your point. Actually, I believe Mr. Horner would like to answer.

Mr. HORNER. Very briefly, Congresswoman Napolitano. You have raised an excellent question. It is an issue that routinely arises in P3 transactions, namely, what happens when the party giving the warranty goes away. Who then stands behind the warranty?

There are two answers, typically. The first is a surety. The contract requires the party giving the warranty to obtain a bond to back up the warranty in the event of the insolvency of the entity that is given the warranty. Sometimes a second approach is used, in which the parent company of the private entity separately guarantees the warranties given by the private entity. Typically, those parent companies are substantially better capitalized than the private entity with which the public agency is dealing in respect of a specific deal.

So you have raised an excellent issue. It is one that is dealt with frequently in the structure of P3 contracts.

Mrs. NAPOLITANO. And what would you suggest be an answer? Mr. Njord?

Mr. DEFAZIO. And then we will have to move on to the next panel. Go ahead, Mr. Njord.

Mr. NJORD. I think you pointed out something that is very important. Contractors respond to incentives and they find ways to earn, maximize their incentive earning power. So in the structuring of a contract, the best way to get schedule, quality and budget to meet all in the center is to incentivize those three things. What is most important to you, is it the schedule of the project, is it the cost of the project, is it the quality of the project? You have to provide incentives for that contractor to give you what you want. If you provide the right incentives at the right juncture, they will give you what you are asking for.

And in a design-build world, we are not out there inspecting everything. We are not inspecting every ingredient that Chairman Oberstar talked about in that cake. However, if you provide incentive for the contractor to self-inspect, he will self-inspect.

Mrs. NAPOLITANO. But what if that contractor may be using substandard material?

Mr. HORNER. Ma'am, another excellent question. As Mr. Njord is suggesting, if the contractor used substandard material, it would be liable financially and otherwise for the under-performance of the facility. The prospect of significant financial liability disciplines the behavior of the contractor in ways that are really extraordinary and hard to create by other means.

Mrs. NAPOLITANO. That turns into litigation. Thank you, Mr. Chair.

Mr. DEFAZIO. The lawyers will also profit.

[Laughter.]

Mr. DEFAZIO. I want to thank this panel. Thank you for your generous grant of time. We have a few things to follow up on and we will expect to hear about those. Thanks for coming across the Country.

We will move on to the next panel now, panel two.

Mrs. NAPOLITANO. Mr. Chair, while they are coming up, may I request for the record that a copy of the 2006 findings, the design-

build, be submitted, unless you already have it? I have already asked your counsel, so that we can see and maybe share with some of our agencies whatever the findings have been?

Mr. RAY. Absolutely. The 2006 report on design-build will be delivered to you. We will do that. As well as, if it is okay, the summary document on our environmental, the SAFETEA-LU environmental flexibilities. We will also have that delivered to you.

Mr. DEFAZIO. The implementation scheduled, yes. Great. Thank you.

Mr. RAY. Thank you.

Mr. DEFAZIO. We will begin, I want to thank the panel for sitting through the first panel, which went on for quite some time. Hopefully you found it of some interest. If you heard anything during the first panel that you wish to respond to, feel free to depart from your written testimony. I have already read all the testimony; I expect other members have too.

Mr. Yarossi, if you would proceed.

TESTIMONY OF PAUL YAROSSI, P.E., OFFICE OF THE CHAIRMAN, EXECUTIVE VICE PRESIDENT AND PRESIDENT, HNTB HOLDINGS, LTD., RICHARD THOMAS, DIRECTOR OF GOVERNMENT AFFAIRS, AMES CONSTRUCTION, INC., MARIA LEHMAN, P.E., F.ASCE, CHIEF OPERATING OFFICER, CHAZEN COMPANIES; DENNIS HOULIHAN, LABOR ECONOMIST, AMERICAN FEDERATION OF STATE, COUNTY AND MUNICIPAL EMPLOYEES

Mr. YAROSSI. Thank you, Mr. Chairman and Congressman Boozman and Chairman Oberstar and Subcommittee members. Thank you for the opportunity of providing testimony on how innovative contracting methods such as design-build are becoming increasingly important in maintaining and growing an efficient transportation system, a transportation system that is vital to the American quality of life and global economic growth and competitiveness.

For the record, I am Paul Yarossi, President of HNTB Holdings, one of the Nation's leading engineering and architectural firms. I also serve as co-chair of ARTBA's SAFETEA-LU reauthorization task force, which is developing the association's vision for the next transportation bill.

HNTB's viewpoint comes from information from our 3,000 professionals in more than 60 offices. We are premier providers of design services to your State and toll authorities. We are helping our clients incorporate today's most innovative best practices and contracting methods.

Our transportation system is stressed. Not since the inception of the interstate system have we seen, at the pace we see today, needs outweigh available funding. Essentially, given the revenue and staff available, State DOTs and transportation owners cannot afford to maintain their existing transportation system within current funding levels, let alone build new capacity. There is no silver bullet that will solve these financial problems.

However, new and innovative ways to finance, design, build, operate and maintain transportation facilities must be part of the solution.

We are seeing a growing number of States adopt design-build methods to build projects faster and often less expensively. The key element of design-build is that one entity assumes responsibility for the majority of the design and of all of the construction. Advantages to design-build include a simplified owner role which requires fewer owner resources; less cost escalation as a result of fewer claims; time savings, since design and construction are done concurrently; and increased possibility of innovation.

As an example of design-build I was going to use the I-15 project, but you heard from Secretary Njord about that. It was $32 million under budget and delivered significantly ahead of time and is a great example of how design-build can work. In St. Louis, Missouri, for a 12 mile reconstruction of I-64, Missouri DOT used an innovative design-build approach that essentially delivered what was estimated to be $600 million worth of improvements for $420 million.

Many factors need to be considered when determining the best procurement method for any given project, including the project's goals, complexity, funding plan, design intent and risk allocation. The more flexible owners are in their design-build approach, the more innovative design-builders can be, result in owner expectations being exceeded. However, design-build is not a cookie cutter approach for all projects, and as you heard in a lot of the testimony today, each project needs to stand on its own merit as the correct way of contracting a project.

Another trend in innovative contracting is public-private partnerships, or P3s. Your Committee is well versed in P3s, having held numerous hearings on the subject, and heard more about them today. P3s, along with design-build, are pieces of a solution of a much bigger and more complex transportation problem. But as we turn to P3s and design-build, we need to proceed in a very deliberate, systematic way with an overall vision of the future of the transportation system. The focus of P3s should be to further the overall enhancement of our transportation system and not simply to be a mechanism of balancing a budget.

Some P3 lessons that we have learned is, for existing facilities, it is very important to understand the long-term value of the asset at hand prior to the negotiations. The overall vision of the entire transportation system is needed up front. If existing facilities are tolled, the revenue must stay in transportation. We should consider toll pricing based on traffic demand and manage flow to get the most out of the system. And you can consider mass transit, especially bus rapid transit, in the free flow of a P3 lane.

I hope this gives you some insights into changes we are seeing as we go through our business in delivering transportation projects around the Country. Thank you for the opportunity.

Mr. DEFAZIO. Thank you.

Mr. Thomas, the Chairman has many good things to say about you, but he is going to withhold at the moment to hear from you. Thank you for being here.

Mr. THOMAS. Thank you, Mr. Chairman.

My name is Richard Thomas. For the last 16 years, I have served as Director of Government Affairs at Ames Construction. I have been involved in transportation policy at the local, State and Federal levels.

I am currently President of the Minnesota Transportation Alliance. I serve on the board of directors for Center for Transportation Studies at the University of Minnesota. Ames Construction is a heavy civil and transportation contractor with annual volume typically between $500 million and $600 million. We have permanent offices in Burnsville, Minnesota, Denver, Colorado, Salt Lake City, Utah, Phoenix, Arizona and Carlin, Nevada. We build airports, roads, bridges, dams, rail projects for public and private owners across the United States.

My stepfather, Dick Ames, started the company in 1960, and we are proud to say that we are still family-owned. Some of the projects that we have worked on are Denver Airport, Route 52, the Legacy Parkway and S.R. 189 in Utah.

This morning, I have been invited to share with the Committee some of the challenges facing small and mid-size firms when public transportation agencies use non-traditional contracting practices. As you well know, our Nation's infrastructure is aging rapidly. Most States have a difficult time funding the backlog of transportation projects. This has led to a whole host of ideas to fund and deliver our projects in a timely fashion and add value to those projects.

Many of the new methods have great potential to strengthen our transportation system. But they also bring with them new challenges, particularly for small and mid-size construction firms. One of the biggest trends in the transportation industry over the last decade has been the move toward larger projects with extended durations. These projects typically range from $250 million to $1.5 billion. They tend to be primarily design-build. Some of these are public-private partnerships, while others are State or regional projects.

The biggest challenge facing small and mid-size contractors is not performing the work on these projects; but rather, getting the opportunity to work on these projects. Major projects require contractors to get mega-bonds and few sureties are willing to assume the risk exposure for these large projects. In fact, any single surety is generally unwilling to accept exposure greater than $250 million under any given bond. But with co-surety and the right contractor team, large bonds can be provided. This in effect limits the bidding on these projects to only a few large firms.

This is further compounded by the trend toward shifting the risk associated with project funding to the contractor. Warranties are a good example of this. Many owners want extended warranties on projects, anywhere from three to five years, and as you have heard earlier, some even up to 10 years. I understand that they want that security.

However, that security comes at a price. Warranties require larger bonds, they drive up the cost of a project, and they also serve as a barrier to small and mid-size contractors who have less of an ability to secure these bonds.

Major projects and public-private partnerships typically use the design-build method of construction. Design-build, as you have heard, has many advantages. It is the fastest delivery method; a firm cost of the project is established before significant financial and time commitments are made; the owner can make well-in-

formed decisions regarding design, quality and cost throughout the design process; there is a single source of responsibility for the entire project; it encourages more innovation; and it reduces the number of claims.

However, design-build has its limitations as well. The first is subjectivity. Unlike design-bid-build, which takes the lowest responsible bid, the design-build method will select the design-builder whose proposal scores the highest on evaluation criteria. Because the evaluation includes the human element, it cannot be completely free of subjectivity.

The second design-build limitation would be the qualification barriers that contractors must overcome to bid on that project. In the States that we work in, most of our competitors have a lot of road and rail building experience. However, on most design-build projects, the only experience that evaluators look at is on design-build projects. So it is kind of a catch-22 for some contractors, because if you can't get on a design-build project, it is kind of difficult to get that experience required.

Local contractors are often denied the opportunity to compete on transportation projects they would have been able to bid if they were awarded under the traditional system of design-bid-build. This is a problem even for larger firms with design-build experience like ours. Despite the fact that we have completed several large rail projects that were design-bid-build, we have had situations where we failed to make the short list on design-build rail projects that were even smaller in scale than projects we have worked on.

Another major obstacle for contractors on design-build contracts is financial net worth requirements. Those design-build projects with net worth requirements disqualify most contractors from competing, regardless of their ability to deliver the project. I have seen cases where design-build projects, where contractors were disqualified from being selected on design-build projects due to net worth requirements, despite the fact that they had successfully completed projects that were larger in financial terms and also that had greater risk. Financial net worth requirements should not be required, provided the proposer can obtain 100 percent payment and performance bond and have the ability to finance the work.

My final point on design-build is the relationship between price and projects, technical score. In Minnesota, when we drafted the State's design-build law, we ensured that price would be a major factor in awarding the project. When owners put too much emphasis on non-construction elements of a proposal, the result is a process that I would suggest is more akin to a beauty contest. It all too often excludes good proposals that would add to the cost of a project. To date, every design-build project in Minnesota has been awarded not only to the team that has had the highest technical score, but it has also had the best price.

Mr. DEFAZIO. A good point to wrap up on, I think.

Mr. THOMAS. The last thing I would say before closing is, dealing with public-private partnerships, we strongly believe there is a place for public-private partnerships. There are always going to be places in the Country where they want to speed up, expedite a project or there are other circumstances. With that being said, I

think we need to make it perfectly clear that PPPs are no substitute for a comprehensive transportation plan. Our fear is that we are going to become too reliant on PPPs in the future without increasing our traditional funding sources.

Thank you.

Mr. DEFAZIO. Thank you, Mr. Thomas.

Ms. Lehman.

Ms. LEHMAN. Mr. Chairman and members of the Subcommittee, good afternoon. My name is Maria Lehman, I am the Chief Operating Officer of the Chazen Companies. Chazen is a privately owned consulting engineering firm with more than 180 employees in the Hudson Valley. Our principal offices are in Poughkeepsie, Troy, Newburg and Glens Falls, New York.

I am pleased to appear before you today on behalf of the American Society of Civil Engineers to present our views as the Subcommittee examines new and existing methods to deliver transportation projects. It is important to remember the condition of the Nation's infrastructure when discussing the best way to deliver infrastructure projects. In 2005, ASCE released a report card for America's infrastructure, which gave the Nation's infrastructure a grade of D based on 15 categories. Roads received a grade of D, bridges a C and transit a D plus. With so much progress to be made, Federal, State and local governments need all the tools available to deliver quality infrastructure projects.

Public-private partnerships are contractual relationships between public and private sectors in infrastructure development. Innovation in public works contracting abounds. We see it across the continuum, from the traditional design-bid-build contract to the design-build contract to the build-operate-transfer contracts, or P3s. No matter which contract type is chosen, the selection of the right source, the designer, the contractor, the designer-builder or the concessionaire is the most critical element to the success of the acquisition. Lowest price based source selection is common in the public and private contracting arena. But this approach may not necessarily provide the most economical end results or desired best value.

Small businesses have not been very supportive of P3s, as they feel that large engineering firms will muscle them out of this important market. Federal regulation could remedy this by set percentage of actual engineering to be done by small local businesses that have local expertise, both in conditions and regulatory expertise. For example, a candidate project in upstate New York might be the Grand Island bridges. While a major engineering firm certainly has the expertise in big bridge design and some elements of maintenance, without local expertise of geology, weather, snow and ice removal, long-term maintenance costs will be incorrectly calculated. Local expertise will tell you how to deal with removal of 7 feet of snow in a 48 hour period, or understand the damage to a structure based on heavy salt loads needed to keep the facility operational in severe events.

Qualification based selection. The Federal Government has been using innovative contracting methods for professional design services since 1972, when QBS became the procurement method for architectural and engineering work. ASCE believes that the selection

of professional engineers as prime consultants and subcontractors should be based on the qualifications of the engineering firm. Qualifications, including training, experience, capabilities, personnel and work loads, should be evaluated when selecting an engineering firm.

Accordingly, ASCE supports QBS procedures, such as those specified by the Brooks Architect-Engineers Act of 1972 and the American Bar Association's Model Procurement Code for State and Local Governments for the engagement of services. Design-build project delivery, a client-driven innovation, initially was seen as a fast track solution to traditional delays in the construction of major public works projects. It is a delivery system that has been successfully implemented on many private sector projects and thus, many small firms are very familiar with its implementation.

One note for small firms. Because of the high cost of preparation for design-build proposals for complex projects, it is imperative for a small business approach that the cost of presentation is reimbursed by the owner. This payment not only acknowledges a real value for the work performed but also gives the owner the right to the intellectual property.

Use of life cycle cost analysis principles will raise the awareness of clients of the total cost of projects and promote quality engineering. Short-term design cost savings lead to future higher costs. ASCE encourages the use of life cycle cost analysis principles in the design process to evaluate the cost of projects. The analysis should include the initial construction, the operation, the maintenance, environmental, safety and all other costs reasonably anticipated during the life of the project, whether borne by the owner or otherwise affected.

The lack of adequate infrastructure investment in the U.S. has left with a vast backlog of deteriorated structures that no longer meet our Nation's increasing demands. To remedy America's current and looming problem, ASCE has estimated in 2005 a $1.6 trillion investment needed in all categories of infrastructure over the next five years, and called upon a renewed partnership among citizens, local, State and Federal governments, and the private sector.

To accomplish the goal of rebuilding the Nation's critical infrastructure, engineers, architects, contractors and Government agencies need to expand the tools available to deliver quality projects. ASCE appreciates the Committee's willingness to address this important issue.

Thank you for the ability to present our testimony.

Mr. DEFAZIO. Thank you.

Mr. Houlihan.

Mr. HOULIHAN. Thank you, Mr. Chairman. I am Dennis Houlihan, I am with the American Federation of State, County and Municipal Employees.

As you know, I sit before you in a somewhat awkward situation. Mr. Blanning tried to get here yesterday. He was frankly my choice, I thought he would be an excellent witness. He is a professional engineer. But nature intervened. We thought it was better to get his testimony in the record. If there are questions about it that I can't answer, we will supply.

Mr. DEFAZIO. You could proceed. I have read the testimony, I believe other members have. We will be happy to put it in the record and then see how the questions go.

Mr. HOULIHAN. That would be fine.

May I add, as you asked, if there are other observations which I feel a little more comfortable speaking about, and I will be very brief.

Mr. Duncan, in the early moments today, mentioned about one of the critical things we need to be considering about any kind of contracting as oversight. As you have heard from us before, we are very concerned about the staffing levels in State DOTs. We are worried about the overall engineering shortage, no matter what type of procurement system you go through.

I want to thank Mr. Oberstar, I understand there is Government Accountability Office report now looking at this, the GAO has contacted Mr. Blanning, and indeed, that has gone beyond other unions. I wanted to just bring that issue up.

The other one is on the issue of public inspection. It is related, it is in his testimony. I have heard it not only at the engineering level, but through our Association of State Highway and Transportation Unions, people who do everything from concrete inspection, all levels of inspection, feel that the levels of staffing in their agencies have declined.

I don't want to put all the blame here, in conclusion, on the DOTs themselves. I understand some of this is a political problem. I think it goes across both sides, both political parties. When you talk to DOT directors, they say, we would like to have greater staffing, but we have the problem of caps on employment in the States, and we can't get the people, even though the money might be there. I don't know, we have discussed this before a bit and we are still thinking about this, is this a Federal issue? Well, yes, in the sense that the Federal Government has oversight, and the stewardship of the funds.

But the program is operated at the local level, what is the appropriate role for the Feds to tell the States what to do? It is something we are going to have to address, but it is something of concern and I hope perhaps as you go through the oversight process we might have a chance to talk about this again. I will conclude with that. Thank you very much.

Mr. DEFAZIO. Excellent. Thank you for summarizing. Thank you for standing in. I know that is often a difficult thing to do.

There are a couple of questions that occur to me. And actually, to your last point there, Mr. Houlihan, I wondered as I was reading the testimony about the warranties and whether we are essentially, in some cases, substituting warranties for the degree of public oversight that might be necessary to assure quality control. I wonder what sorts of costs are associated with those warranties and whether or not it might be less expensive to actually hire staff to monitor the quality as we go along, than to assume that the contractor is going to do it because of the warranty requirements.

So Mr. Houlihan or Mr. Thomas, you referenced that, or anybody who wants to address that issue.

Mr. HOULIHAN. Well, of course I think it is a very interesting question. I don't have a direct answer to it, other than this. In try-

ing to get a comparison of what any alternative to using in-house staff would be has been a struggle in the States.

However, there have been some successes. I just offer one, a simple one we are looking at. In Wisconsin now they are doing, because there was a statute passed, they are doing at least kind of an educational piece. The legislature has asked the agency to compare the cost of using in-house staff versus using a contract design staff. It is not binding on them, but it does give information which over time might build a record.

I heard your comment on this earlier, caught my ear, of course. I think that is something we might, if not at the Federal level, we may want to advocate as these warranty ideas come up at the State level. We are always trying to push, as you know, for a rigorous analysis of the alternatives. Thank you.

Mr. DEFAZIO. Knowing the cost benefit would be helpful. We have been nationally, I know, contracting out at higher expense in many, many areas. I don't know, although there was analysis, I believe, in the testimony of the gentleman who you replaced, about the cost in California. He made the same point that the people that were being hired, contracted, were more expensive that the State employees. I assume that included a calculation of benefits.

Mr. Thomas, you raised the issue of warranties. Do you want to address that?

Mr. THOMAS. Mr. Chairman, I would say, like others in our industry, we are not opposed to warranties. I think folks have to come into this with their eyes wide open. There is a warranty for a year, which is typical, that is acceptable, that is not a problem for the industry. I think it is when you get into the longer duration where you get into the problems. Contractors have to pay higher bond costs for that. That is going to be a cost that we are going to have to put into the project, which is going to raise the cost of the project.

So I think that is something that DOTs have to look at, how important is it to have that for that particular project, and is that something that they are willing to pay for.

I do, however, think that the larger warranties, it does have a bigger impact on your small and mid-size companies, because of their ability to be able to get a bond for those long-term projects. We have even seen them in Minnesota on small projects as well, which I believe at the time was more, the DOT was looking at it is as kind of a trial run. And they have kind of backed off on that a little bit.

But I think it is more, you have to be aware that this is going to add cost to the project. If that is something that a DOT feels they are willing to take on, it is what it is.

Mr. DEFAZIO. Ms. Lehman?

Ms. LEHMAN. A couple of comments on that. First of all, I agree that the overall shortage in engineering staff is an issue around the Country, whether you are on the public side or private side. I did serve as a commissioner of public works for five years on the public side. So I understand it from both sides.

But I think you are talking not just quantity, but also quality. One of the concerns that I have is in State government and in Federal Government, the credentialing is not as important as it is in

the private sector. The requirement of having a P.E., the Office of Personnel Management on the Federal side does not recognize getting a P.E. as an appropriate event. It doesn't distinguish people working for Federal Government whether they have the license or not.

My personal feeling as being someone who, on the public side, had to have a P.E. in my position, when I am personally liable for my decisions and it is my skin in the game, I was much more balanced and public-minded in my decision process. Because it is something that in the State of New York, if my kids see something from my inheritance, they are going to be liable, because there is no statute of repose in the State of New York. So I take it very seriously.

As far as warranties relative to the engineering industry, it is problematic. Because of the complication of design-build, where you are part of that contracting team, and because of joint and several liability, warranties are not something that the insurance industry will allow us. It is an exclusion specifically in engineering, in any of the insurance mechanisms that are around in the United States. So it is problematic. There is a lot that needs to be resolved to be able to get there.

The other issue of warranties that is a little problematic is that at some point, is it a function of bad design or bad contracting, or is it a function of lack of maintenance, and where is that continuum and where does lack of maintenance kick in versus faulty product in the first place. So it is a matter of trying to figure out and balance those two things.

Mr. DEFAZIO. Interesting observation.

Mr. Yarossi, on page 4 of your testimony was a point which came up at the earlier panel, but it certainly deserves some emphasis. You said as we turn toward P3s and design-build, we need to proceed in a very deliberate, systematic way with an overall vision of the future transportation system. And then you go on from there.

How do you envision, in the States that are adopting 3P laws that allow unsolicited bids, how do you see they are going to incorporate or deal with that in their STIP, if it is outside their STIP?

Mr. YAROSSI. I do have a problem with that, Mr. Chairman. I would reinforce what Secretary Njord said, that the way we are going to get an efficient and a transportation system nationally that is going to give us what we need, higher quality of life, some resiliency to natural and man-made disasters and global competitiveness, is to have that system plan in place. And I am just personally, and my company is a firm believer in that the plan comes first. I think all that we have heard in all the testimony, all that you have read are all part of the solution. Each project that builds into that plan that makes the program that makes the system in my opinion needs to be individually analyzed. There is probably a little bit of right in everything we have heard. When we put all the little bits of right together, we are going to find the right way to both build and finance the system.

Mr. DEFAZIO. Okay, thank you.

With that, I would turn to Chairman Oberstar if he has some questions.

Mr. OBERSTAR. Thank you, Mr. Chairman. I greatly appreciate the contribution of the panel this morning, afternoon now, for very thought-provoking commentary.

I think, Mr. Yarossi, you said it well, I wish I had phrased it myself, that for the first time since the beginning of the interstate system, we see needs outweighing available funding. That is really what is happening. That is the dilemma. What futurists usually do is way overstate, way over-predict what is going to happen.

In the case of transportation, however, future projections of needs have greatly fallen short of actual performance. In the decade of the 1990s to 2000, population growth in America was about 4 percent. But highway usage grew 19 percent. Aviation grew about the same, 19 to 20 percent growth over that period of time. Rail exploded and is continuing to grow. In every mode of transportation, use has outperformed by factors of four and five to one population growth.

Our funding has not kept pace. We knew that was the case when the Commission reported to the Congress in 2003, which was required in TEA-21 legislation, the Department of Transportation established this commission, evaluate pavement condition, bridge needs, safety requirements, congestion. And recommend an investment level to the Congress for the next six year program. They came back with a recommendation of $375 billion. Chairman Young at the time and I introduced that bill in October of 2003 and asked for, at the same time appealed for a 5 cent increase in the user fee.

Gas was $1.34 a gallon at the time. It went up over a dollar in less than a year. It went up to over $3.20 during the time we were considering the follow-on legislation that became SAFETEA-LU. So on the one hand, yes, the needs are outweighing funding. But it is the policy makers that are not keeping up with the requirement to provide the funding. And the public is willing to accept and invest. They don't understand much about where the rest of their taxes go, but they do understand the highway user fee. They do know if they pay, they buy the gas at the pump, they are paying the fee and they drive away on better roads and better bridges and safer.

So we are now forced because of these failures in the Executive Branch to accept an increase in funding, we are faced with alternative ways, imaginative ways of financing the transportation needs of the Country. And Mr. Thomas has been, Mr. Chairman, has been a leader in the State of Minnesota with the Transportation Alliance, with the business community, with the contractors, in advocating for an increased investment in Minnesota's transportation system.

The legislature has responded, both house and senate committees have passed, each in different ways, 10 cent increase in the user fee. That along with other revenues that were generated also from transportation needs will create a billion, 200 million dollars in the State of Minnesota to match the available Federal funds. And unfortunately, we have at the State level a replica of the national level, a Governor who can't figure out a way to do what he knows needs to be done, and that is to make a greater investment.

So because of the failure and the inability of the State to match available Federal construction dollars, we had an extraordinary cir-

cumstance last summer. The State of Minnesota Department of Transportation put up a $235 million contract to rebuild I-35 across town in Minneapolis and no one bid on it. Now, Mr. Thomas, Ames is not a small organization. Was this a design-build, was this a standard project? Why did contractors not bid on this project? I know part of the answer to that. But you go ahead and say it for the record.

Mr. THOMAS. Mr. Chair and Representative Oberstar, the problem with the Crosstown, frankly, I think was a breakdown of communication between and expectations between MinnDOT and the contractor and financial community. There were two teams that were prepared to bid on that project. To really simplify it, the problem we have with the Crosstown project is, contractors were willing to help finance the project. But there was no guarantee at the end of the day that they would get paid. The financing for the project was dependent upon future Federal funding. As you well know from the last transportation bill, sometimes that takes longer than what folks anticipate. And there was none of the bonding companies that were willing to finance that risk. The only precedent we had had previously in Minnesota was, a situation like that, was the monorail at the zoo, and the folks that invested the money never did get paid.

It wasn't, the issue wasn't so much the way of delivering the project, but the financing, the construction community and the finance community had met early on with MinnDOT and expressed to them the issues that we had with the project. So for the first time in history, we did, we had a project that there were no bidders. Interestingly enough, the project was bid a couple of weeks ago, and there were only two bidders on that project as well. Typically, and I think that is kind of a sad state of affairs, too, that we are losing some of our competition. Because I think in that case, it was more because of the size of the project.

Mr. OBERSTAR. Thank you for that explanation and discussion of it. Yes, the State really expected contractors to finance their own work.

Mr. THOMAS. Right.

Mr. OBERSTAR. And that is just not acceptable.

How does that, though, differ from a design-build approach? And you raised some very interesting questions, and I think others did as well, that design build includes some hidden costs. You have called the mega-bonds, that in the case of design-build, you may be shifting the risk to the contractor as well as the warranty approach. Warranties also, as I said, in discussion with the previous panel, shift the risk to the contractor. That will require more bonds and higher costs.

I hadn't really thought about that higher cost. I wonder if other panelists have a comment on that observation, Mr. Thomas.

Mr. THOMAS. Well, I think with design-build, Mr. Chairman, that your costs are probably higher at the initial phase. But I think you can offset that with getting the project done sooner. Probably the example I would use would be the Lock 52 project in Rochester, Minnesota, which you are familiar with. Under the traditional method, design-bid-build, this would have been a 12 year project. We bid the project in four and completed it in three. And to be

quite honest with you, we got it done in three because there were incentives. I think one of the earlier speakers had spoken to that. That certainly I think is a good tool to get projects done faster.

But I think there are ways, I think, that you can add cost to design-build projects. I think if you are, obviously, if you are requiring the contractors to do more things, to take on more risks, there is going to be more cost associated with that as well. There is just no getting around that.

I think when one is deciding whether to use design-build or design-bid-build, I think there is a whole host of criteria that DOTs ought to look at first. And I think for the most part, at least the States we work in do a pretty good job of determining which projects to use for design-build and which projects not to use for design-build. Because there are pros and cons for each method.

But yes, I think your biggest added costs are going to be because you have to deal with the risk involved.

Mr. OBERSTAR. And there is the issue of oversight. Mr. Yarossi, do you have comments?

Mr. YAROSSI. Yes, I do. I think Mr. Thomas is exactly right. Again, every project needs to stand on its own merit as to what form of contracting is the right form of contracting to use. And it goes even into on the ability of material supplies, the local contracting community, what is the size of the local contracting community, the resources that are available to the local contracting community, as well as the time and cost savings that can be involved.

So I would say that we hear a lot about design-build. Design-build has worked very well in many cases. Design-bid-build has worked very well in many cases, and they both have problems in some cases. I think it is our responsibility as infrastructure professionals and professionals in the industry to advise our clients on what is the best way to use contracting methods. And it is the DOT's responsibility to determine which is the best way to put a project out.

Mr. OBERSTAR. Mr. Houlihan, I suspect that AFSCME has concerns about oversight of such projects, public-private partnerships and the design-build and other devices to speed up the contracting and fill the gaps in financing. But eventually, the State has responsibility in our system, unless we go to a complete warranty approach to contracting, as we discussed with the earlier panel.

But Ms. Lehman raised a question that I have heard great concerns from groups around the Country, and that is a shortage of engineers. Engineering schools aren't graduating enough personnel. There are not enough available for the private sector, enough for the public sector. Your organization represents those who are quality control, they represent the public interest in assuring that contracts are fully carried out. Do you have a comment about that aspect?

Mr. HOULIHAN. One observation I have heard is that the salaries in the public sector are really too low in engineering to compete. You will hear this, I have heard this, obviously our members often feel this way. But also, I have heard DOT directors talk about their difficulties of recruiting. Or they can recruit for a while, and then

they run into retention problems. They get people for a while but then they move on.

That is the essence of what I hear. There have been a number of forums of which the civil engineers have been involved in through the TRB. We have been involved to try and figure out, how do you get people, what are the incentives to move more into engineering. I don't feel like there has been a particularly good solution offered there. I don't really have an answer to it. We are sympathetic.

And the other area that we all observe, I think, probably particularly in the public sector, is the aging. We are all aging, obviously, but the boomer population moving through, and let's say the public sector in some cases has been a model employer, in the sense that we have had reasonable wages and benefits, we have had good pension plans, like everyone should have, every worker should have. Some of them are thinking, well, maybe I can retire now, but there is still a lot of useful time left on my skills. They may be leaving earlier than we might like, but they are not leaving the work force, they are leaving to move over into the private sector.

There is some concern, I think, within our members and the unions more broadly than AFSCME about that revolving door a little bit. That is, the people in the senior management in the agencies feel sometimes they are moving from a senior management position as time goes on into the private industry, which of course is their right to do. But then they kind of, it begins a kind of momentum about, let's move more work into the private sector. That is maybe an unanticipated consequence, but one that we are concerned about.

Mr. OBERSTAR. Ms. Lehman, you raised that issue. I would just make a footnote that on Friday and Saturday I was meeting with the Minnesota Veterans Hospital. They had the very same problem of attracting and retaining cardiologists and other specialties who in the private sector are making upwards of $450,000 a year and the VA is paying the same ones $125,000 or $135,000 a year. Can't attract them and when they do, they can't retain them.

Ms. Lehman?

Ms. LEHMAN. Just one comment. Looking at the perspective as the world is flat, India and China have more honors engineering graduates than we have engineering graduates in the United States. We put out 70,000 a year, and of that, a third are not U.S. citizens. That is very concerning, and we are looking at all kinds of different methodologies.

One of the things that I do in my non-day job is I am a school board member on my local school board. Math and science education is really what is holding people back in the technologies. We have to solve it more upstream of the pipeline than at the end. I think engineers have been looking at it at the university level. The solution is probably in middle school, and we have to take a harder look at that.

Mr. OBERSTAR. Thank you. One final observation, and I want a reaction on this. The State of Missouri is experimenting with a bridge reconstruction initiative in which the State DOT has proposed to let a contract to a single firm for reconstruction and rehabilitation of 700 bridges in the State. It will be a multi-billion con-

tract over a period of maybe 10 to 20 years. They are still negotiating the final terms of it, in which the contractor will take over the total program. They will do rehabilitation, they will probably create a standard format for each bridge to be done pretty much the same way, kind of, I hate to use the term cookie cutter, because you are not really cutting cookies here, these are big bridges. And will have the responsibility for managing all the subcontractors. No one firm can do 700 bridges.

But they are supposed to deliver those bridges within roughly this 10-year period. The State will monitor and evaluate, determine whether they are meeting the standards. They won't get paid until the contract time expires and then the State will start repaying them.

That is really innovative financing. I wonder what your reaction might be.

Mr. YAROSSI. We have looked at that extensively. Our largest office is in Kansas City. We are trying to determine how a consultant engineer participates in that type of a program, which really is more along the lines of a developer type of a situation than we have normally seen, I think even in P3s.

I would have to say that from my standpoint, the jury is out as to what I think of that. It really is revolutionary. There is a significant period of time where there is no money that flows either way except for out of the developer's pocket.

Mr. OBERSTAR. And the contractor has to go out in the marketplace and find financial institutions willing to put up the money and support them.

Mr. YAROSSI. And Mr. Chairman, it appears that those financial institutions are there, which gives us second thought to take a look. Because they must see something involved in it. It really is a unique situation that we are studying pretty hard to see how we participate.

Mr. OBERSTAR. Apparently it will not involve tolling, either, thank God.

Mr. YAROSSI. No, and it is a long-term maintenance contract, where you turn over the bridge in some condition. Don't quote me on the years, but it is long-term. It is 35 years or 40 years contract.

Mr. OBERSTAR. That is right. Do others have a comment on that?

Ms. LEHMAN. I think you are going to pay for the risk up front. Someone is going to have to pay for that risk. And I think the financial institutions.

I have experience in programmatics and doing a lot of small things in a program management cookie cutter type experience. There it makes a lot of sense, when you have a lot of smaller facilities, there is a lot of local, as a lot of local governments have, to be able to use that approach. But when you start getting into the multi-billions, you are going to pay for the risk. It is a matter of assessing the risk.

Mr. OBERSTAR. And that will reduce the available competition to only a handful, two, three national firms with mega-fundraising capability.

Ms. LEHMAN. Correct.

Mr. OBERSTAR. A very, very serious concern for us.

Mr. Chairman, this whole series of hearings on which you have launched is vital for the future of transportation. We have a huge challenge facing us in the reauthorization of SAFETEA-LU and the future transportation program for the Country. Raising the user fee is one part of it, central to it, in my judgment.

But exploring other means of squeezing as much productivity out of the surface transportation construction delivery is our responsibility. We have to look at all of these options. The deeper we look into each one of them, the more challenges and the more problems and the more hidden difficulties appear.

Thank you for your constructive, thoughtful, persistent and patient pursuit.

Mr. DEFAZIO. I thank the Chairman for his support in this effort. It is going to be, as I have said previously, hopefully a surface transportation and transit reauthorization for the 21st century, a major evolution from what we have done historically. I look forward to partnering with them in that effort as we go forward.

I want to thank the witnesses for their patience, for contributing their expertise. With that, this hearing is adjourned.

[Whereupon, at 12:53 p.m., the committee was adjourned.]

Subcommittee on Highways and Transit

Hearing on the "Public-Private Partnerships: Innovative Contracting"
Tuesday, April 17, 2007

Statement – Congressman Jason Altmire (PA-04)

Thank you, Mr. Chairman, for holding this hearing today on the innovative contracting and procurement techniques under public-private partnerships. I appreciate your attention to how government contracts are structured by the Federal Highway Administration, Federal Transit Administration, and other agencies to design, renovate, construct, operate, maintain, and manage a facility or system.

I am sure my colleagues feel the same way as I do about the length of time it takes to design, build and complete transportation projects throughout our districts and states. Expediting the process from the initial concept to the dedication ceremony is a goal that we all want to strive for as these projects are often critical to the economic development of our local communities.

In recent years, the federal government has utilized more innovative contracting and procurement techniques in partnership with private entities and moved away from conventional contracting that follows the design-bid-build sequence. This raises a number of important questions and I am glad we are taking the time today to thoroughly review the process and its impact.

The increased utilization of innovative contracting and procurement techniques under public-private partnerships has had unintended consequences in its impact on small businesses. I am concerned that when projects are put out to bid, the current process favors large conglomerates as they are able to handle multiple aspects of a project and outbid smaller competitors simply based on economies of scale. I hope we will have the opportunity to discuss how we can improve innovative contracting to ensure small business owners are on an even footing.

Thank you again, Mr. Chairman. I yield back the balance of my time.

# # #

Rep. John Mica
Ranking Member, Committee on Transportation and Infrastructure
Tuesday April 17, 2007 10:00 am

- Mr. Chairman, Thank you for holding today's hearing on innovative contracting techniques for highway and transit projects.

- When public private partnerships are debated today many people only consider tolling. However the most common types of public private partnerships in highway and transit projects today involve innovative contracting, not tolling.

- Traditionally highway and transit projects are build through the design-bid-build process. State DOTs or public transit agencies would design the project; the project is then let out to bid for construction with the lowest bidder receiving the contract to build the project.

- Today, State DOTs and public transit agencies are using a variety of innovative contracting techniques to improve the delivery process for highway and transit projects.

- On the highway side, these techniques include design-build contracting, warranties, cost-plus-time bidding, and lane rental arrangements.

- On the transit side, several high profile projects have used either the design build contracting method or the design-build-maintain-operate (DBOM) contracting method. These projects include the extensions to the Baltimore Light Rail Transit System, the BART San Francisco

Airport extension, and the Hudson Bergen LRT line.

- These innovative contracting techniques enable State DOTs and public transit agencies to take advantage private sector management skills and private sector capital to ensure that the project is delivered on time and on budget.

1

Statement of Rep. Harry Mitchell
House Transportation and Infrastructure Committee
Subcommittee on Highways and Transit
4/17/07

--Thank you Mr. Chairman.

--As you know, Arizona is now the fastest growing state in the nation.

--Our rapid growth has created an urgent need for highways...a need that is out-pacing our ability to pay for them.

--According to the Arizona Department of Transportation, over the next 20 years, we will need at least $9 billion for just 12 of our major highway corridors...and these corridors represent just 36% of our state's total highway miles.

2

--Making matters worse, Arizona is a "donor-state." We send more money to the federal highway trust fun than we receive in the form of highway funding. At last count, we are receiving just 90.5% of our fuel taxes back in the form of highway funding.

--In the last hearing on this issue, I was encouraged to learn of the amount of planning, experimentation, and thought that has already been given to this strategy, especially on how it impact commuters and the general population. I am concerned that public private partnerships are not quite ready for broader-implementation, though.

--If we are serious about meeting our growing highway needs, we must think creatively.

3

--The question remains: are public private partnerships the way to go?

--I am still skeptical.

--I think we pay enough taxes, and should not have to pay more for what we already have.

--When the public pays to build a road, and then years later, someone throws up a toll booth to start charging for what we already own…that's a double-tax.

--On the other-hand, if a private developer wants to voluntarily contribute to a highway project, that seems like less of a problem.

--I look forward to hearing from today's witnesses, and learning about their experiences in other states.

--I yield back the balance of my time.

Fred Hansen
Tri-County Metropolitan Transportation District of Oregon
4012 SE 17th Ave.
Portland, OR 97202
503-962-4831

Testimony
Of
Fred Hansen, TriMet General Manager
Before the House Congressional Highways and Transit Subcommittee of the Transportation and Infrastructure Committee
April 17, 2007

Chair DeFazio and Members of the Committee:

For the record I am Fred Hansen, General Manager of TriMet, the transit district for the Portland, Oregon metropolitan region. It is an honor to appear before the committee today.

TriMet is recognized for its successful light rail system. We are currently building our fifth light rail line – the I-205/Portland Mall Light Rail Project – which will bring the system to a total of 52 miles when it opens in 2009. What makes our light rail so successful, and a national and international model, is the connection between transit and land use. It's about connecting people to their community and having a community built or enhanced around the transit system.

We are also known for our success in delivering major projects on time and on budget, and our innovation in accomplishing this. A case in point is TriMet's third light rail extension – the 5.5-mile Airport MAX line. It was the first train-to-plane connection on the West Coast when it opened on September 10, 2001. It also was the first public/private light rail/real estate development project in the country.

It came about when San Francisco-based Bechtel Enterprises approached the Portland region with a proposal to design and build light rail to the Portland International Airport earlier than anticipated in our regional plan. At the time, the Port of Portland was preparing to build new airport parking at significant cost, so advancing light rail was appealing as a way to reduce the need for parking. Bechtel and the Port came together with five other public agencies including TriMet and the city of Portland, to create a funding plan. We identified a number of existing funds including tax increment financing, a $3-per passenger facility charge and TriMet general funds as resources for the project.

The $125 million financing package was completed when Bechtel agreed to accept development rights to 120 acres at the entrance to the airport. The 120- acre site owned by the Port was vacant, but slated for low-density industrial and distribution uses that are typical around airports. Bechtel envisioned it could develop the property more

intensely if it were served by light rail. Through an innovative 99-year lease arrangement for the 120 acres, Bechtel contributed $28.3 million of the $125 million rail construction project.

While no federal New Start funds were utilized, the project fully complied with NEPA through an Environmental Assessment. Because it was locally funded, we were not required to follow the Federal Transit Administration's New Starts process, which sped the pace of the entire project.

While the review and approval process was streamlined from a federal perspective, the project required 85 agreements among the parties and nearly 20 formal approval steps by local elected and appointed bodies. This ensured that the public investment would be protected, while much of the risk was appropriately assigned to the private sector. The design-build contract between Bechtel and TriMet was facilitated by our unsolicited proposal policy, which fosters private sector innovation while ensuring fairness. Our unsolicited proposal policy has been designated an industry best practice by the FTA as a model for other agencies.

Benefits
There were many benefits associated with this light rail/development deal:

- It allowed the project to be built years, if not decades sooner than anticipated. It provided the public with high quality transit service to the airport terminal. A trip on Airport MAX takes just 37 minutes from downtown Portland to the terminal – often a faster trip than other transportation options. And the price is just $2 – a taxi ride could run up to $40 for the same trip.

- Airport MAX took about four and a half years to move from an idea to opening for service. The pace of the approval process, along with the private investment and no federal dollars or FTA process, cut two years off of the overall schedule, reducing the risk of inflation and driving up project costs. The final design and construction took two years from the time approved agreements were executed, and featured a fast-track design/build construction plan.

- One of the signature elements of the project is called the Flyover Bridge. It carries trains from the median of Interstate 205, across four lanes of a busy highway and lands in the Port of Portland property as it heads to the airport terminal. What is amazing about this is that it was built without any highway closures, no disruptions to drivers and no safety incidents. Actually, the biggest disruption was from gawkers watching the construction of the bridge.

- Ridership continues to grow, as the airport continues to see increased passenger travel. It also provides good transit service for the growing base of airport employees.

- And *finally*, Bechtel envisioned a unique $400 million mixed-use business and lifestyle center served by two light rail stations. Plans for the development – known as Cascade Station – called for hotels, a conference center, Class A

offices, shops, restaurants and leisure time activities, making it a 24-hour destination and create an estimated 10,000 jobs at full build out. Full build out was expected to be completed in about 15 years.

Lessons Learned
Now, eight years after the idea for the Airport MAX extension and innovative real estate deal, there are some lessons learned that are instructive when considering a public/private venture.

Success in making a design/build process successful, as this one was, depends on the public sector project sponsor being a sophisticated project manager. Design/build does not absolve the public sector of its management and oversight responsibility. The final cost of the project grew from the initial estimate by about 2 percent.

Airport MAX opened the day before the terrorist attacks of September 11, 2001. Unfortunately, 9/11 dramatically changed the travel industry. In addition, Portland and the rest of the country slid into a multi-year recession immediately following 9/11.

Because of these dramatic market changes, the Cascade Station site sat idle until liberalized zoning in 2005 allowed three large format retailers to move the site to development. A key lesson learned is that while it is important for the private sector to shoulder significant risk, the unanticipated events of September 11 caused very significant and permanent changes in the potential development benefits for our private sector partner. The "hit" taken by Bechtel on this project may have had a dampening effect on their interest and that of others in pursuing similar projects. Perhaps the sharing of risk in certain extraordinary circumstances or insurance against certain risks should be a feature of future projects like this one.

The reconfigured development plan for Cascade Station is less intense than originally envisioned, but is still substantial. It will yield 800,000 square feet of retail space, 1.2 million square feet of office space, 250 hotel rooms and other support services. This will provide 7,000 jobs and $2.4 million in annual property taxes to the city of Portland. Construction is now underway, with nearly $500 million in development, including a new IKEA store set to open this July.

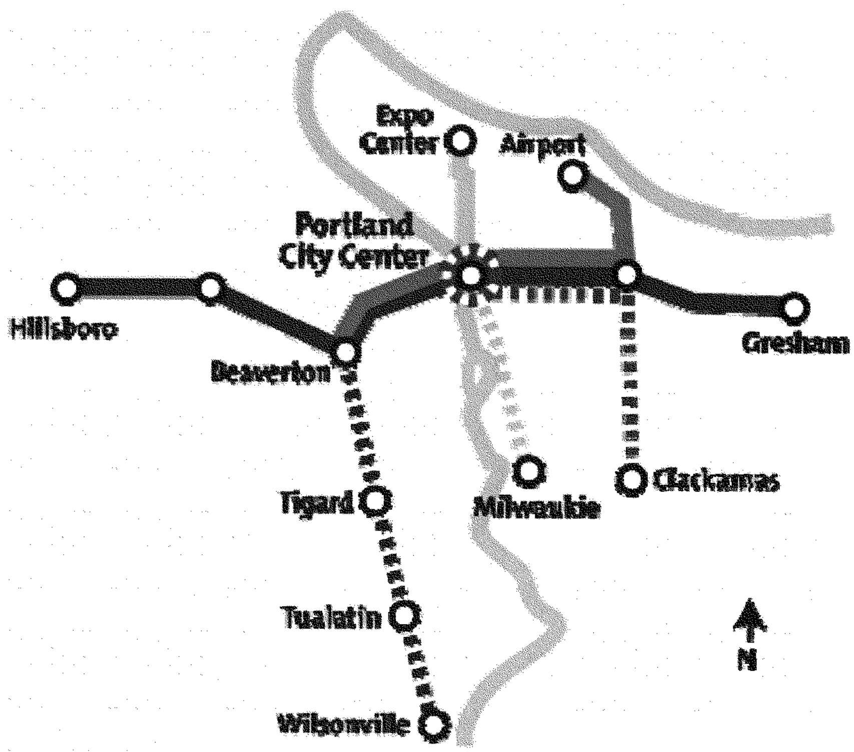
Another key reason for the success of this process is TriMet's experience as an experienced public owner and public operator, and the historical cooperation of local agencies in Portland to help bring these projects to construction.

In closing, the Airport MAX light rail and real estate project was the first of its kind in the country. It brought the region the airport rail connection years ahead of schedule and the private sector carried many of the risks with the development deal. We would gladly undertake such a partnership again. I believe that public/private partnerships can be successful, with all parties committed to a streamlined process to reduce risk to public and private investments.

Thank you.

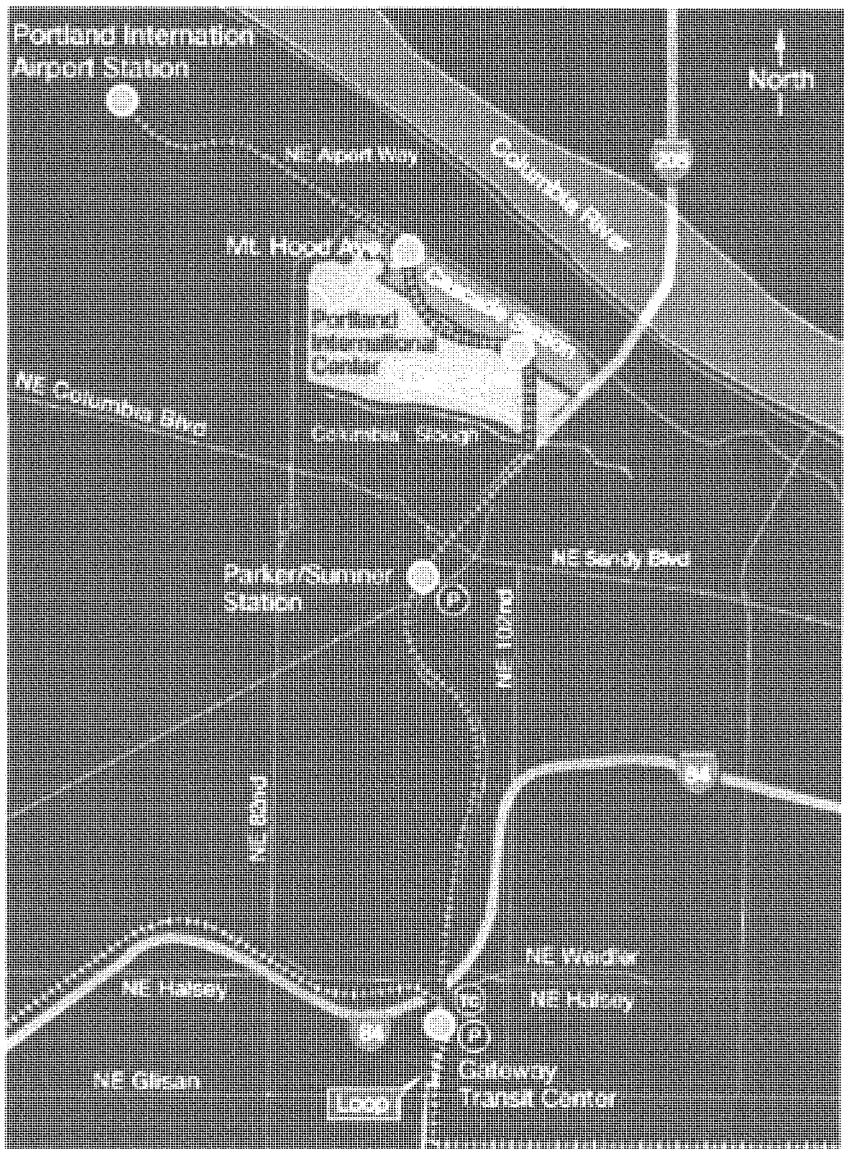
TriMet Regional Rail System

52-mile light rail system
15-mile commuter rail line



Cascade Station Map

As part of the transit-real estate public/private partnership, Bechtel Enterprises secured development rights to120-acres at the entrance to the Portland International Airport. Cascade Station is served by two light rail stations.

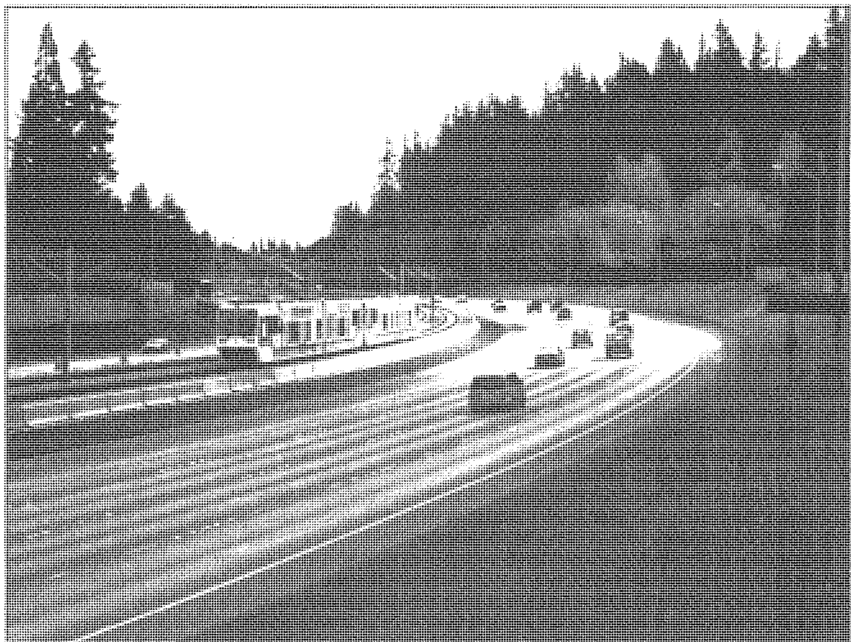


"Flyover Bridge"

Built over four lanes of I-205 without any lane closures, delays or safety incidents.

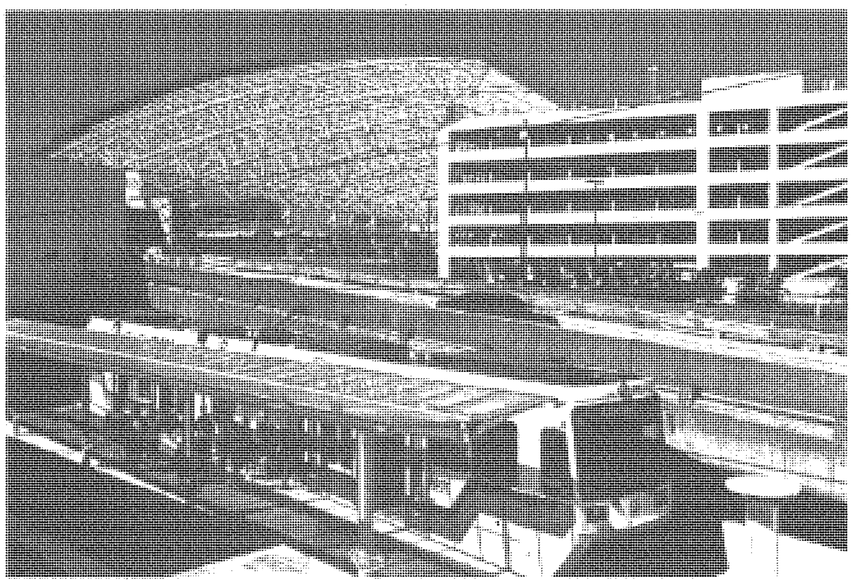
Airport MAX on I-205

Airport MAX was built in the existing transitway that was incorporated into the design of the I-205 highway nearly 30 years ago.



Airport MAX at the Airport Terminal

Trains serve the southern end of the terminal.
Trains arrive at the airport between 4:45 a.m. and midnight.



Statement of David B. Horner, Esq.
Chief Counsel, Federal Transit Administration
U.S. Department of Transportation

before the

Committee on Transportation and Infrastructure
Subcommittee on Highways and Transit
U.S. House of Representatives

on the

Role of Innovative Contracting in the Delivery and Operation of Major Transportation Infrastructure Projects

April 17, 2007

David B. Horner, Esq.
Federal Transit Administration
U.S. Department of Transportation
400 Seventh Street SW, Ninth Floor
Washington, D.C. 20590
David.Horner@dot.gov

Chairman DeFazio, Ranking Member Duncan, and Members of the Subcommittee, my name is David Horner. I am the Chief Counsel of the Federal Transit Administration ("FTA"), an agency within the U.S. Department of Transportation (the "Department"). I greatly appreciate the opportunity to testify today about innovative contracting in the delivery and operation of transportation infrastructure projects, one of the most important trends in transportation today. Under the leadership of Secretary Mary Peters, the Department believes that innovative public-private contracting must play a central role in reversing the decline of system performance, while also improving overall transportation system safety.

Although innovative contracts are relatively recent in the world of public transportation investments, there is little question that their importance will grow over time as public agencies and elected officials seek to increase accountability to customers; stimulate innovation; reduce large operating deficits; and improve the accuracy of cost forecasts, among other things. While the need to improve performance forecasting under traditional procurement has received less attention than other challenges, it is no less important. The success or failure of innovative contracting should be judged by the degree to which it improves upon current methods of system delivery.

How we build and operate our transit infrastructure is a matter of increasing importance to the Nation's transportation system. The Federal financial commitment to transit construction has been, and remains, substantial. Since Congress passed the Intermodal Surface Transportation Efficiency Act of 1991, FTA's New Starts program has contributed in the aggregate approximately $17.6 billion[1] to 44 projects. The average total cost of each of those projects has been approximately $835 million.[2] Federal funding through the New Starts program alone, excluding other Federal assistance, has accounted for approximately 47% of those costs on average.[3] That investment has been made in support of important goals: congestion relief, environmental benefits, mobility, and community-building. The return on Federal dollars expended on transportation should be scrutinized, particularly given the growing competition for resources at all levels of government. How transit projects perform—whether

[1] Expressed in year-of-expenditure dollars.
[2] Expressed in year-of-expenditure dollars.
[3] See, National Transit Database. The Federal commitment to transit is not limited to capital expenses. In Fiscal Year 2005, for example, approximately $1.5 billion of Federal transit assistance (or 25.5% of FTA's §5307 and §5309 capital program combined) was expended on "preventive maintenance"—a category of costs eligible for Federal support that includes certain operating costs. FTA defines preventive maintenance costs as "[a]ll the activities, supplies, materials, labor, services, and associated costs required to preserve or extend the functionality and serviceability of the asset in a cost effective manner, up to and including the current state of the art for maintaining such asset." See the *National Transit Database Manual* at http://www.ntdprogram.gov/ntdprogram/Glossary.htm.

they are built on time, on budget, and realize the benefits expected from them—affects the public's support for new projects and, more broadly, its view of the Federal transit program.

In the circumstances today, we should ask whether we should pursue new approaches to funding, building, and operating transportation services, including transit services. More to the point: given the widespread and acute deterioration of the surface transportation system, is it not time to experiment broadly with alternatives? For many years, the U.S. enjoyed substantial amounts of excess capacity along many sections of our transportation systems. That era is over. In the past 20 years, hours of vehicle delay and wasted fuel have each quadrupled. The cost of wasted time and fuel for travelers in 2003 was over $60 billion. If we add the extra time people must allow in planning for congestion delay and the lost productivity associated with it, the annual costs rise to roughly $170 billion. These costs have been growing at about 8% per year—almost triple the rate of growth of the economy. The extent, duration, and intensity of delay associated with these costs have all skyrocketed over the past two decades.

In my testimony today, I would like to describe how innovative contracting, commonly referred to as "public-private partnerships" or "PPPs," can help transit agencies address the challenges of limited resources, project performance, and accuracy in forecasting. We think these methods of procurement, if widely adopted, will not only improve delivery of new transit capacity but contribute significantly to the general betterment of the Federal transportation program.

FTA's Public-Private Partnership Pilot Program. Before discussing the benefits of PPPs, I'd like to discuss the Public-Private Partnership Pilot Program (the "Penta-P" or "Pilot Program") established by FTA in January 2007 pursuant to Section 3011(c) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (or "SAFETEA-LU"). Through the Pilot Program, FTA is inviting project sponsors to experiment with alternative project delivery in order to identify more effective ways of building transit projects for the American public. As organized by FTA, the Penta-P serves at least two functions. The first is to study whether innovative system procurements realize the benefits ascribed to them. The second is to study how the New Starts program should take into account an expanded role for the private sector in major system procurements. FTA's recent publication in the Federal Register sets forth the terms of its Pilot Program and its objectives in detail.[4]

I am pleased to report that, in March, FTA received four applications for the three spots in the program allowed by statute: BART's Oakland Airport Connector, Houston METRO's METRO Solutions Program, the Denver Regional Transportation Authority's Fastracks Program, and the bus-rapid-transit (or "BRT") elements of Georgia Regional Transportation Authority's I-75 Corridor.

[4] *Notice of Establishment of Public-Private Partnership Pilot Program; Solicitation of Applications* (January 19, 2007) (72 FR 2583).

Given the experimental nature of the Pilot Program, FTA intends to designate as Pilot Projects those projects that exhibit high "demonstration value." In determining the extent to which a project exhibits demonstration value, FTA will consider, among other things: (i) the number of project elements for which the private partner is responsible, (ii) the quality of risk allocation with respect to the cost and ridership of the project, as set forth in the public-private agreement, (iii) the extent to which equity capital and development proceeds are contributed to the project and the terms on which such capital is contributed, (iv) whether the project is part of a congestion mitigation plan that incorporates system-wide congestion pricing, and (v) the expected effects of the foregoing arrangements on (A) the speed of delivery of the project, (B) the quality of delivery and performance of the project, and (C) the reliability of the projections of costs and benefits associated with the project.

To encourage project sponsors to experiment with alternative delivery, the Pilot Program is offering project sponsors incentives in the form of adjusted ratings of cost-effectiveness and financial commitment, accelerated process, and other benefits. I would be happy to discuss them with the Committee.

Pilot Projects that are candidates for funding under FTA's New Starts program will be evaluated and rated in accordance with the rating criteria of the New Starts program, as adjusted to account for their "demonstration value." Accordingly, Pilot Projects that receive an overall rating of "Medium" or higher and a rating for cost-effectiveness of Medium or higher, as adjusted for their demonstration value, may be recommended to Congress for New Starts funding.

Funding recommendations and other final approvals with respect to a Pilot Project—together with any procedural or rating benefits received by the project under the Pilot Program prior to a funding recommendation—would be conditioned on the project sponsor and the private partner having entered into a public-private agreement that, in the opinion of FTA, safeguards the Federal interest. If the parties fail to enter into a satisfactory agreement, FTA will rescind the benefits received by the Pilot Project and remove the Pilot Project from the Pilot Program.

What are Transit PPPs? As applied to transit (and for purposes of the Pilot Program), PPPs are essentially a form of procurement for new capacity. Transit PPPs contemplate a single private entity, typically a consortium of private companies (a "private partner"), being responsible and financially liable for performing all or a significant number of functions in connection with a project. By agreement with the private partner, the project sponsor shifts final design and other short or long-term risks to the private partner, and the private partner receives the opportunity to earn a financial return commensurate with the risks it has assumed. In order for a PPP to work, the private partner must assume meaningful financial risk in some form—for example, through an equity

investment, liability for indebtedness, a fixed priced contract, a long-term warranty, assumption of ridership risk, or a combination thereof. As I will explain below, the effectiveness of a transit PPP depends on the scope of responsibility and degree and kind of risk assumed by the private partner with respect to the project.

Economic Benefit. Because substantially all transit assets are cash-flow negative (and transit PPPs rarely, if ever, contemplate the escalation of fares by a private operator to increase revenues), the financial opportunity for transit agencies is the *avoidance* of costs—an opportunity known as "subsidy-minimization." The concept of subsidy minimization (and how transit PPPs differ from many highway deals) may be illustrated as follows: In the case of a transaction for an existing highway—a cash flow *positive* asset—the sponsoring agency asks the private sector *"How large a concession payment will you pay me?"* In the case of a transaction for new transit capacity—a cash flow *negative* asset—the sponsoring agency asks the private sector *"How small a subsidy will I pay you?"* Private operators then compete for the opportunity to provide service not by bidding up the concession payment but by bidding down the subsidy. The financial return to the private builder-operator, if any, is the difference between its cost to deliver and operate the system, on the one hand, and the system's total revenues, including public subsidy, on the other. The public agency sponsoring the project may pay the subsidy to the private operator in the form of "availability payments" over a term of years, subject to the system being delivered and operated—made "available"—according to performance requirements negotiated and approved by the project sponsor.

The subsidy minimization model is being used with powerful effects for multiple types of infrastructure.[5] In transit, perhaps the most compelling example of a transit PPP is the first minimal operable segment (or "MOS-1") of the Hudson-Bergen light rail line in New Jersey.[6] That project was delivered, and is now operated, by Washington Group International pursuant to a design-build-operate-maintain (or "DBOM") procurement by the New Jersey Transit Corporation ("NJTC"). The partnership between NJTC and the Washington Group resulted in the project entering revenue service five years ahead of schedule at substantial cost savings—by some estimates, totaling approximately $345 million—as against the cost that would have been paid under a conventional design-bid-build procurement.[7] Nominal savings realized by

[5] See, for example, the bids made last week by three companies to deliver and operate the Port of Miami Tunnel. Those bids came in 47%, 42%, and 7% below the maximum allowable bid to deliver the tunnel over 50 months, 47 months, and 42 months, respectively. "Miami Port Tunnel Bids Opened," *Miami Herald.com*, April 4, 2007.

[6] For a description of the project, see United States General Accounting Office, *Mass Transit: Status of New Starts Projects with Full Funding Grant Agreements* (1999: GAO/RCED-99-240), p. 23.

[7] See *Report to Congress on Public Private Partnerships* (2004), U.S. Department of Transportation, p. 39.

expedited delivery alone amounted to approximately $45 million.[8] Estimated additional savings of $11 million were realized by integrating design and engineering functions with construction services. Estimated savings of $20 million were realized by the avoidance of claims and litigation typical in conventional procurements.[9] Since the late 1990s, two additional transit projects have been procured as DBOMs: the second minimal operable segment (or "MOS-2") of the Hudson-Bergen line and the JFK Airtrain.

Although there are few transit PPPs in operation in the United States today, several innovative procurements are in the pipeline. Among the most progressive is the procurement for the Oakland Airport Connector sponsored by the Bay Area Rapid Transit District ("BART").[10] With its request for proposals to be issued next month, the project contemplates a design-build-finance-operate (or "DBFO") procurement in which the concessionaire will be responsible for substantially all aspects of the system's design, construction, and operation and liable for approximately 50% of the project's costs. Another innovative PPP, based on a DBOM contract, is the METRO Solutions capital program sponsored by Houston METRO.

Performance Benefit. Transit PPPs stand to provide other benefits in addition to economic savings. Principal among these are better project quality and the avoidance of delay attributable to claims and litigation. These benefits are derived from the allocation of risks to the private sector and its assumption of responsibility for multiple project elements, such that the private operator is concerned with a project's performance over its lifetime. FTA's forthcoming *Report to Congress on PPPs in Transit*,[11] now nearly complete, documents a number of these and other benefits based on surveys with transit agencies around the Nation that have used innovative procurements. We look forward to sharing our findings with Congress in the near future.

Improvement in Forecasting. If widely adopted, PPPs can additionally be expected to improve the quality of performance forecasts used to justify investments in transit and transportation infrastructure generally. The quality of projections of costs and benefits, specifically those expressed as ridership estimates, is important: With better forecasts, decision-makers may make better informed choices about the use of taxpayer resources.

Perhaps the most promising method for improving performance forecasting is the PPP. In particular, the private sector's requirement for a financial return and agreement to assume risk for costs and benefits should

[8] Id.
[9] Id.
[10] See http://www.leaelliott.com/Information/PDF/APM%2005%20Papers/40766-7723.pdf
[11] The report is being prepared pursuant to §3011(c)(6) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users.

discipline the preparation of performance forecasts. The reasons are intuitive. No contractor would offer to perform work for a fixed price (and thereby accept liability for cost overruns) unless it was confident that the estimated price of the project were accurate. Likewise, no private concern would accept ridership risk in calculating its financial return if it believed that the project's forecasted demand was likely to be inaccurate (however strong that forecasted demand might be). For these reasons, one preeminent economist, Professor Bent Flyvbjerg, has suggested that, absent other solutions to the problem of forecasting, no infrastructure project should receive public investment unless it is partly funded by private risk capital.[12] In the long-run, better forecasts will improve decisions to build transit, better serve the riding public and strengthen the justification for Federally-subsidized transit investment. More flexible authorizing statutes for transit authorities would provide them better ability to pursue these opportunities.

Legal Reform. In order to realize the benefits of PPPs for transit agencies and the riding public, limited reform of state and Federal law is necessary, particularly in the area of procurement. In evaluating PPP proposals, the government sponsors need to be able to take into account not just the proposed capital cost but also the value of commitments made by the private partner, risks associated with the proposal, and public policy issues. Under most State law applicable to transit today, however, government agencies must segment their procurements and award contracts on the basis of the "lowest responsible price." Bidders are also required to bid on precisely the same bid package. While these requirements can promote equality of business opportunity and financial stewardship, they stifle creativity and deter life-cycle-oriented proposals that offer lower total costs in the aggregate. The same laws also preclude the sponsoring agencies from engaging the *most qualified* contractor if it is not also the lowest responsible bidder.

Separately, with only limited exceptions, both state and Federal law require performance bonding well beyond what is commercially feasible for project sponsors (or required by private investors) and disregard the availability of other forms of security.

Conclusion. If evidence is needed that transit PPPs are more than a trend, the experience in the "transit-rich" United Kingdom is instructive. So effective has the PPP model become in that country that, under its *Private Finance Initiative* (or "PFI"), the UK Treasury requires government agencies to evaluate using PPPs to procure transportation infrastructure before using

[12] Bent Flyvbjerg et al., *How (In)accurate Are Demand Forecasts in Public Works Projects?*, 71 JOURNAL OF THE AMERICAN PLANNING ASSOCIATION 131, 143 (2005) ("The decision to go ahead with a project should, where at all possible, be made contingent on the willingness of private financiers to participate without a sovereign guarantee for at least one third of the total needs. . . . Private lenders, shareholders and stock market analysts would produce their own forecasts or would critically monitor existing ones. . . . The result would be more realistic forecasts and reduced risks").

conventional procurements.[13] Clearly, our Nation faces challenges at the Federal, State, and local levels in addressing our mobility needs. Innovative contracting provides a means of meeting them. These approaches, however, are not merely stop-gaps in times of fiscal scarcity. They are, instead, solutions that represent significant improvements over conventional delivery models. In these circumstances, why would we not broadly experiment with alternatives?

Chairman DeFazio, Ranking Member Duncan, and Members of the Subcommittee, thank you for this opportunity to testify. I would be pleased to answer any questions you may have.

[13] See http://www.hmtreasury.gov.uk/media/1E1/33/bud06_pfi_618.pdf. Typically under the PFI, the private sector designs, builds, finances, and operates facilities based on 'output' specifications decided by public sector managers and their departments—a role for the private sector far more expansive than is customary in the United States today.

ASCE

American Society of Civil Engineers

Washington Office
101 Constitution Ave , NW, Ste 375 East
Washington, D.C. 20001
(202) 789-7850
Fax: (202) 789-7859
Web http //www asce.org

Testimony of the AMERICAN SOCIETY OF CIVIL ENGINEERS on Public Private Partnerships: Innovative Contracting before the Highways and Transit Subcommittee Transportation and Infrastructure Committee U.S. House of Representatives April 17, 2007

Mr. Chairman and Members of the Subcommittee:

Good morning. I am Maria Lehman. I am the Chief Operating Officer of the Chazen Companies. Chazen is a privately owned consulting engineering firm with more than 180 employees in the Hudson Valley. Its principal offices are in Poughkeepsie, Troy, Newburgh, and Glens Falls, New York.

I am pleased to appear before you today on behalf of the American Society of Civil Engineers (ASCE) to present our views on **"Public Private Partnerships: Innovative Contracting"** as the Subcommittee on Highways and Transit examines new and existing methods to deliver transportation projects.

It is important to remember the conditions of the nation's infrastructure when discussing the best way to deliver infrastructure projects. In 2005, ASCE released the Report Card for America's Infrastructure, which gave the nation's infrastructure a grade of "D" based on 15 categories. Roads received a grade of "D," bridges a "C," and transit a "D+." With so much progress to make, federal, state, and local governments need all the tools available to deliver quality infrastructure products.

A. Public-Private Partnerships

Public-private partnerships (PPPs) are contractual relationships between public and private sectors in infrastructure development. They have been defined as "a cooperative venture between the public and private sectors, built on the expertise of each partner that best meets clearly defined public needs through the appropriate allocation of resources, risks and rewards." PPPs have been practiced worldwide in both developed and developing countries with multiple

objectives including promoting infrastructure development, reducing costs, increasing construction and operation efficiencies, and improving service quality by incorporating private sector knowledge, expertise, and capital.[1]

These PPPs span a spectrum of contractual models from straight contracting out to outright privatization, with increasing responsibilities and risks allocated to the private sector. However, no matter which PPP model is used, the regulatory control remains the responsibility of the public sector, which determines the kind of public works and services to be acquired and the quality and cost requirements on the delivery of such works and services, and takes necessary remedial actions for substandard performance.[2]

Innovation in public works contracting abounds. We see this across the continuum—from the traditional design-bid-build contract, where the client contracts sequentially with the designer and then with the contractor; to the design-build contract, where the client contracts with a single source to design and build a project; to the build-operate-transfer (BOT) contract in public-private partnerships, where the client contracts with the private-sector partner who is responsible for financing, designing, constructing, and operating during a concession period, and then transferring the built facilities to the client when the contract ends. No matter which contract type is chosen, the selection of the right source—designer, contractor, designer-builder, or concessionaire—is critical to the success of the acquisition. "Lowest price" based source selection is common in public and private contracts. But this approach may not necessarily provide the most economical end results or the desired best value.[3]

Nevertheless, our research has discovered a wide range of barriers to public–private partnerships in infrastructure development. These are broadly classified as to (1) social, political, and legal risk; (2) unfavorable economic and commercial conditions; (3) inefficient public procurement framework; (4) lack of mature financial engineering techniques; (5) problems related to the public sector; and (6) problems related to the private sector.[4]

B. Qualifications-Based Selection (Design-Bid-Build)
The federal government has been using innovative contracting methods for professional design services since 1972 when qualifications-based selection (QBS) became the procurement method for architectural and engineering work.

---

[1] Xueqing Zhang, M.ASCE, Factor Analysis of Public Clients' Best-Value Objective in Public–Privately Partnered Infrastructure Projects, 132 ASCE J. CONSTR. ENG'G & MGMT 956 (2006).

[2] Id.

[3] Zhang, Public Clients' Best Value Perspectives of Public Private Partnerships in Infrastructure Development, 132 ASCE J. CONSTR. ENG'G & MGMT 107 (2006).

[4] Zhang, Paving the Way for Public–Private Partnerships in Infrastructure Development, 131 ASCE J. CONSTR. ENG'G & MGMT 71 (2005).

Often an owner may believe that the pivotal issue in the selection of a professional engineer is the cost of the necessary services. Also, an owner may perceive that accepting the lowest bid to perform the work produces the project with the lowest total cost. In this case the owner is of the belief that the required engineering services are completely described and the qualifications of all engineers are equal.

ASCE believes that it is impossible to describe the required scope of engineering services in this manner. When construction operations and maintenance are considered, the lowest cost engineering services will generally not produce the lowest total project costs. Further, ASCE believes that the owner should have an established policy for designating individuals to serve on the selection committee. The selection committee should contain at least one professional engineer and others who are familiar with the project requirements.

ASCE believes that the selection of professional engineers as prime consultants and subcontractors should be based on the qualifications of the engineering firm. Qualifications—including training, experience, capabilities, personnel, and workloads—should be evaluated when selecting an engineering firm.

The cost of engineering services, while important and meriting careful negotiations, is related to the work to be performed, which often is not clearly defined at the time the engineer is selected. Therefore, selecting consultants based on cost is not recommended.

Accordingly, ASCE supports qualifications-based selection (QBS) procedures such as those specified by the Brooks Architect-Engineers Act of 1972, 40 U.S.C. §§ 1101-1104, and the American Bar Association's Model Procurement Code for State and Local Governments for the engagement of engineering services. ASCE recommends that the application of these procedures to the development of a scope of work and the selection, procurement and administration of contracts for engineering services be the responsibility of technically qualified staff of the project owner. This would include people with engineering or construction backgrounds.

Congress subsequently has clarified and extended the application of the QBS process to the awarding of architectural and engineering services contracts for:

- Aviation programs project grant application.
- Mass transportation contract requirements, management and architectural engineering.
- Military construction projects.
- Engineering services as competitive procedures for procurement purposes.
- River and harbor improvements.
- Surveying, mapping, charting and geodesy contracts of the National Imagery and Mapping Agency (NIMA).

The QBS procedure is characterized by three basic steps: (1) the owner selects the professional engineer believed best qualified to perform the required work without considering fee; (2) the owner and the selected professional engineer confer to determine and/or review the scope of work; and (3) a fee for engineering services is negotiated based upon the mutually developed scope of work.

Thus, cost is addressed at the appropriate time after the scope of services has been fully defined. Pre-contract communication between the owner and engineer to jointly develop a scope of work, as called for in step 2, is critical to the success of the project and ensures a mutual understanding of the owner's expectations for the work and the specific services the engineer will provide.

A poorly defined scope of required services can result in numerous change orders. Lacking specifics, each firm will, in order to be competitive, submit a price for the least amount of work reasonably envisioned. Detailed analysis of the problem and the search for innovative and lasting solutions, or even the comparison of the obvious alternatives is precluded. This approach is likely to result in minimal engineering work that will not properly evaluate the overall cost of construction, operation and maintenance of the project.

QBS procedures are most effective when administered by those who best understand the unique nature of the service being sought. The procurer's experience with engineering organizations and proposed services, coupled with appropriate training in procurement matters, provides the required knowledge, thereby enhancing the efficiency of the civil works process.

The QBS process has been so successful at the federal level that it is recommended by the American Bar Association in its model procurement code for state and local government. More than 40 states have enacted their own qualifications-based selection laws for architecture, engineering, surveying and mapping services. Others use it as a standard procedure. Today, no state has a specific law requiring bidding of architectural or engineering design services.

C. Design Build Project Delivery

The design-build project delivery system is one of several innovative project delivery systems available to government agencies and private businesses. Its implementation by the FHWA has been mismanaged, however.

Design-build project delivery—a client-driven innovation—initially was seen principally as a "fast track" solution to traditional delays in the construction of major public works projects. The methodology was thought initially to give less weight to cost and potentially allow many more contracts to be awarded outside the customary low-bid approach.[5]

Design-build is a method whereby an owner can focus design and construction responsibility through a single contract. However, this contracting method presents certain challenges that

[5] Paradoxically, precisely the opposite has occurred. As a general matter, government clients seem to favor low-bid awards designed and built by highly qualified contractors under a design-build project, according to a recent study of 110 RFPs issued by 11 federal agencies (none of them FHWA) between 1999 and 2002. See Douglas Gransberg, P.E., M.ASCE, and Ronald Barton, Analysis of Federal Design-Build Request for Proposal Evaluation Criteria, 23 ASCE J. MGMT ENG'G 105 (2007).

must be addressed if quality is to be maintained. These issues are (1) procuring a highly qualified design-build team; (2) providing the contractual mechanism enabling the designer to fulfill its professional and ethical obligations to the owner as well as the public; and (3) providing the contractual mechanism which expresses the owner's requirements in the proposal and their fulfillment in the delivered project.

ASCE strongly supports the use of the two-phase competitive source-selection process required by the Federal Acquisition Reform Act (FARA) of 1996, 41 U.S.C. § 253m, for design-build contracts awarded by government agencies. The design-build team must be selected using the modified QBS criteria specified by the Act. The owner must provide sufficient architectural and engineering services to prepare the design-build request for proposal (RFP) to identify the disciplines needed in the design-build team, and to evaluate, manage and assess the owner's requirements throughout the project.

The contract between the design-build team and the owner must establish the means for direct communication between the owner and the designer as well as other team members. On complex projects, the owner must provide predetermined reimbursement for the firms selected to make complete design-build proposals.

The qualifications of the design-build team must be the primary consideration of selection. Team selection should be accomplished through a qualifications-based process that precedes evaluation of all other considerations. In order for the delivered project to meet owner requirements, the team's designer, as designer of record, must be allowed to fulfill its professional and ethical obligations to the owner as well as the public. The communication link between the designer and the owner must be firmly established at project inception.

Because of the high cost of preparing design-build proposals for complex projects, the owner must provide reasonable reimbursement to the firms selected to submit proposals.

D. Design Build in TEA-21 and SAFETEA-LU

Section 1307 of the Transportation Equity Act for the 21st Century (TEA-21), 23 U.S.C. 112(b)(3), gave state transportation departments the discretion to award a design-build contract for federal-aid highway "qualified projects." Section 1307(c) of TEA-21 defined "qualified projects" as projects whose total costs are estimated to exceed (1) $5 million for intelligent transportation system projects and (2) $50 million for any other project.

The Act also required the Federal Highway Administration (FHWA) to issue a rule no later than June 9, 2001, regulating the awarding of design-build contracts by the state transportation departments. The final rule was issued by the FHWA on December 10, 2002. See federal Highway Administration, Final Rule, Design-Build Contracting, 67 Fed. Reg. 75,902 (Dec. 10, 2002). The rule took effect on January 9, 2003.

The FHWA regulation departed significantly from the objective of section 1307 by authorizing the use of a "single-phase selection process," which is defined as "a procurement process where price and/or technical proposals are submitted in response to [a request for proposals]. Short-listing is not used. Id. at 75,928 (emphasis added). Short-listing is critical to the success of the

design-build process. Additionally, such a "single-phase" process is not authorized in TEA-21 and is contrary to the statute.

The final rule declined to extend the use of the two-phase source-selection procedures required of federal agencies under FARA. According to the agency:

> The Federal Acquisition Reform Act of 1996 does not apply to the federal-aid highway program. The FHWA is encouraging the use of two-phase selection procedures in 23 C.F.R. 636, Subpart B; however, it is not requiring the use of two-phase selection procedures.

Id. at 75,903 (emphasis added).

The FHWA went on to emphasize its opposition to the congressional intent on the use of design-build project delivery contracts.

> "The FHWA does not believe it is appropriate to mandate the use of two-phase selection procedures in the federal-aid highway program. While the federal Government has elected to do so for federal contracting, we do not believe that this is appropriate for the transportation industry. We strongly encourage contracting agencies to utilize two-phase selection procedures, however, the use of two-phase procedures remains optional.

Id. at 75,918.

The regulation cited above clearly departs from the expressed intent of Congress in FARA and TEA-21. Congress has the sole constitutional authority to authorize and build federal-aid highways and must set the FHWA on the proper course.

Indeed, Congress itself fared no better in 2005 when it sought to address the design-build issue in SAFETEA-LU. The 2005 changes frankly missed the mark. Section 1503 of SAFETEA-LU, 23 U.S.C. § 112(b)(3), merely codifies the FHWA's misunderstanding of the expressed intent of Congress in FARA and TEA-21, which clearly stated the negotiation requirements for these project delivery contracts for federal-aid highway projects.

E. Contracting Out

Government agencies should maintain staffs of experienced and highly qualified engineers to properly plan, develop and maintain public works and environmental programs; to perform in-house engineering functions, tasks and projects; to manage and oversee work contracted out to private engineering firms and to maintain the mission and services legislatively mandated for the government agency. Long-range programs are unique to each agency and require continuity of agency engineers. This staff must develop and maintain technical expertise in order to obtain and maintain professional registration.

Consideration of the public interest, cost-efficiency and effectiveness is of foremost importance in decisions regarding the use of in-house government or private engineering firms. The history

of the civil engineering profession has clearly shown that the public is best served, the public trust maintained, and the mission of the government agency achieved by an effective blending of engineering services performed by in-house government engineers and private engineering firms.

During the process of authorizing, funding and administering government engineering tasks and projects, concerns often arise regarding:

- the appropriate levels of in-house engineering staff for the government agencies;
- the need for government engineers to develop and maintain technical engineering skills;
- the need of the profession for government engineers to be registered professional engineers;
- the optimum level of involvement by private engineering firms in government engineering projects; and,
- whether executive, administrative or legislative controls or guidelines should be established setting a fixed percentage of an agency's work to be contracted out to private engineering firms.

ASCE believes it is proper and desirable that civil engineers employed both in the public and private sectors are allowed to perform engineering functions and tasks for government agencies. It is in the best public interest for federal, state and local government agencies performing engineering to maintain expertise within their organizations by employing civil engineers and providing for their professional development.

It is also in the best public interest for publicly supported institutions and agencies not to compete with engineers in private practice. Public sector engineering projects that can be accomplished more efficiently by private engineering firms should be contracted out with proper oversight by the public agency. The resulting ratio of in-house to contracted engineering services should be based upon the agency's on-going project and policy requirements rather than rigid rules or percentages fixed by legislation or regulation.

F. Procurement Workforce

Over the past decade or more, the federal government's capability to do its own architectural and engineering work has been compromised. Retirements, attrition, recruitment and, shifting priorities have all contributed to changes in the federal personnel structure that has resulted in fewer federal employees trained, qualified and actually engaged in evaluating, awarding and managing federal A/E contracts. Notwithstanding this workforce reduction, the federal government's demand and expenditures for A/E services has remained steady or in some cases increased.

The loss of an A/E acquisition workforce has caused a number of undesirable trends in A/E procurement. federal contracts for A/E services have become larger in dollar value, longer in duration, bundled with other services, and less competitive. The advantages of QBS are being diminished. Moreover, given that the private A/E market is overwhelmingly comprised of small businesses, the trend has resulted in the creation of a virtual oligopoly.

There are now fewer A/E contracts. They are now for longer time periods, with some potentially lasting 15 years when options are exercised. The use of design-build procedures, once reserved for rare and unique projects, has become more common. And the advent of GSA Federal Supply Schedules for services has resulted in rampant abuse of such schedule contracts in violation of the QBS law. None of these trends favor the government, and the taxpayer, and they certainly put small business A/E firms at a disadvantage.

The reason for this trend is simple—supply and demand—within the federal government. Fewer government A/E professionals experienced in acquisition are responsible for awarding more work. The Office of Personnel Management (OPM) *does not* recognize the achievement of a Professional Engineering license as an appropriate event and additional credential of value to the government to merit additional compensation. In fact, many federal agencies do not distinguish between licensed and non-licensed engineers.

The Office of Federal Procurement Policy (OFPP) should work with OPM to overhaul its hiring and promotion system for A/Es, and remove barriers for promotion and job advancement for A/Es, while encouraging licensure.

The Defense Authorization Act for FY 2002, 5 U.S.C. § 5757, allows agencies to use appropriated funds or funds otherwise available to the agency to pay for expenses for employees to obtain professional credentials, including expenses for professional accreditation.

The provision applies to all federal agencies, not just to the Defense Department, and establishes statutory authority for agency payment of licensing fees through appropriated funds. This is a valuable recruitment and retention tool for engineers in the federal government and encourages the federal A/E to seek and obtain his or her license. No regulations implementing this provision of law have been implemented. OFPP should work with OPM to more forcefully implement this provision with regard to licensure of federal A/Es.

G. Warranties and Guaranties

The inclusion of warranty or guarantee clauses in contracts for engineering services has been proposed as a way to enhance facility design and longevity. In reviewing this proposal, the following existing facts are considered.

- Most engineering is done by firms with limited financial resources. These firms depend heavily upon engineers' professional liability insurance to provide protection against catastrophic claims and maintain the firm's financial stability.

- Typical engineers' professional liability insurance contains an exclusion to the effect that the carrier "will not defend or pay under this policy for claim and claim expenses arising out of ... express warranties or guarantees".

- Warranty and guarantee clauses create an absolute liability on the part of the warrantor or guarantor and obligate the engineer with regard to matters beyond their control, such as pre-existing construction in rehabilitation projects and post-construction maintenance and enforcement of facility use restrictions.

- Facility owners currently are protected from substandard engineering services by the existing body of contract and negligence law, and such liability is insured by existing engineers' professional liability insurance.

ASCE opposes the inclusion of warranty or guarantee clauses in contracts for engineering services. ASCE believes that alternative and more effective ways of ensuring public safety and efficient construction and maintenance of such structures exist such as:

- Emphasis in the design process of life-cycle costing which optimizes cost and quality.
- Greater consideration to funding a higher degree of maintenance.
- Implementation procedures to reduce delays in planning, right-of-way acquisition, design and construction.
- Encouragement of innovations in technology and management.
- At the start of a project, proper allocation of a project's risk among the parties involved.
- Enhancement and simplification of minimum design standards to provide more cost effective results.
- Provision of greater latitude to owners to utilize design standards which exceed the minimum.

Inclusion of warranty or guarantee clauses will increase the cost of the constructed project, will decrease opportunities for engineering businesses generally and will detract from the public interest.

H. Life Cycle Cost & Surface Transportation Design

The use of Life-Cycle Cost Analysis (LCCA) principles will raise the awareness of clients of the total cost of projects and promote quality engineering. Short-term design cost savings which lead to high future costs will be exposed as a result of the analysis. In the short-term the cost of projects will increase; however, the useful life of a project will increase, and there may be cost savings in operations and maintenance over the long term.

When the cost of a project is estimated only for design and construction, the long-term costs associated with maintenance, operation, and retiring a project, as well as the cost to the public due to delays, inconvenience and lost commerce are overlooked. The increasing use of bidding to select the design team has resulted in a pattern of reducing engineering effort to remain competitive, with the result of higher construction and life cycle costs.

ASCE encourages the use of Life-Cycle Cost Analysis (LCCA) principles in the design process to evaluate the total cost of projects. The analysis should include initial construction, operation, maintenance, environmental, safety and all other costs reasonably anticipated during the life of the project, whether borne by the project owner or those otherwise affected.

I. Conclusion

The lack of adequate investment in America's infrastructure has left us with a vast backlog of deteriorated facilities that no longer meet our nation's increasing demands.
To remedy America's current and looming problem, ASCE estimated in 2005 a $ 1.6 trillion investment in all categories of infrastructure over the next five years and called for a renewed partnership among citizens, local, state and federal governments, and the private sector.

To accomplish the goal of rebuilding the nation's crumbling infrastructure engineers, architects, contractors, and governmental agencies need to expand the tools available to them to deliver quality infrastructure projects. ASCE appreciates the Committee's willingness to address this important issue.

Mr. Chairman, that concludes my testimony. I would be pleased to answer any questions the subcommittee may have.

# # #

ASCE was founded in 1852 and is the country's oldest national civil engineering organization. It represents more than 140,000 civil engineers individually in private practice, government, industry, and academia who are dedicated to the advancement of the science and profession of civil engineering. ASCE is a non-profit educational and professional society organized under Part 1.501(c) (3) of the Internal Revenue Code.

Submitted by Houlihan

PROFESSIONAL ENGINEERS IN CALIFORNIA GOVERNMENT

April 11, 2007

Testimony from
Bruce J. Blanning, P.E.,
Executive Director
Professional Engineers in California Government
660 J Street, Suite 445
Sacramento, CA 95814
(916) 446-0400

The Honorable Peter DeFazio, Chairman
Subcommittee on Highways and Transit
Committee on Transportation and Infrastructure
U.S. House of Representatives
Washington D.C. 20515

Dear Representative DeFazio,

Thank you for inviting me, as a representative of Professional Engineers in California Government, to participate in the Subcommittee hearing on Tuesday, April 17. **Professional Engineers in California Government (PECG)** represents the 13,000 engineers and related professionals employed by the State of California. About 70% of those professionals work for the California Department of Transportation, or Caltrans, planning, designing, administering contracts, inspecting, and operating state highways, freeways, and other transportation systems. PECG represents their professional and employment interests.

PECG supports additional funding for transportation infrastructure, regardless of source, including private funds, and has no position on toll roads. However, we have found that the **procedures used in achieving project delivery have a profound impact on cost, safety, timeliness, and the public interest.**

There are at least ten distinct project delivery procedure alternatives, ranging from the traditional design-bid-build to design-build, construction management, and various others. These are often combined with funding strategies -- for example, a public-private partnership may utilize design-build, perhaps including construction inspection as well, using private funding which is ultimately reimbursed through tolls.

To address these various project delivery methods, PECG established a **set of principles or "Bill of Rights for Transportation Users"** to use as criteria in evaluating various project delivery proposals. There are five elements to this Bill of Rights.

1. Ensure that **taxpayers get their money's worth** for their transportation dollars -- the most projects, at the lowest cost, delivered on time.

2. Safety first! Construction inspection should be performed **by public servants** accountable to the public, not private contractors motivated by profit.

3. Construction contracts for transportation projects should be **competitively bid,** with contracts awarded to the lowest responsible bidder, not subjectively selected.

4. All **tolls** paid for transportation should be **reinvested in the system** for the public's benefit, not siphoned off for private profit.

5. If an agency will be **liable** for a transportation facility, that agency should be **responsible** for designing, constructing, and inspecting the facility.

Unfortunately, some of the procurement methods -- whether privately or publicly funded -- have been far less effective than the traditional design-bid-build process in which publicly-employed engineers design and inspect transportation facilities, awarding a competitively bid contract to a private firm to construct it. In California, **billions of** federal, state, and local transportation **tax dollars have been wasted** on ineffective procedures, ranging from the disastrous Red Line subway in Los Angeles to several more recent design-build highway projects. In all cases where **design-build** or a similar approach was utilized, the **projects cost more than twice as much** as the work was worth (compared to design-bid-build); project delivery was not accelerated; and in some cases, defects in construction were discovered and corrected later at considerable expense.

The enclosed material describes two public-private partnership projects (Route 91 express lanes and Route 125 San Diego toll road) and two publicly-funded projects (the Route 22 Garden Grove freeway and the Route 73 San Joaquin Hills tollway) in California. In all four cases, the design-build approach was utilized, with the consortium also inspecting the work. In all four cases, costs were more than double what had been projected initially. Three of the four projects required either taxpayer bailouts or an extension of the period for toll receipts for the contractor. Two of the four projects were scheduled to be completed last year but are still not open to traffic.

As the projects all utilized private inspectors, there was no meaningful public involvement, so it should not be surprising that some of the construction work was defective.

Design-build costs far more than design-bid-build for several reasons. In design-build, contractors are typically not selected through competitive bidding; their lump sum price proposal is inflated to absorb risks because they don't know what they'll be building; and subsequent change orders drive the price up even further because unforeseen circumstances arise when a construction contract is awarded before design is complete.

In summary, Boston's "Big Dig" may be the national poster child for the failure of an approach which omits procedures which protect the public and taxpayer interest, but it is certainly not unique. **Design-build and similar methods are procedures which shouldn't work in theory and haven't worked in practice.**

Using design-build under a public-private partnership only makes the problem worse because, due to private funding, the involvement by the public agency in the process is typically even less. Only later, when taxpayer bailouts and costly repairs are undertaken, and it is discovered that the toll structure is not adequate to support a project that costs twice what had been anticipated, do the taxpayer and the public interest become involved.

Enclosed are materials describing more fully the "Bill of Rights" provisions, the analysis of the California projects using public-private partnerships and design-build, and a recent presentation to the National Surface Transportation Policy and Revenue Study Commission regarding safe, cost effective expenditures of federal transportation funds.

Once again, thank you for the invitation to provide this material and to participate in the April 17 hearing.

Sincerely,

Bruce J. Blanning
Executive Director

Encl.

PROFESSIONAL ENGINEERS
IN CALIFORNIA GOVERNMENT

February 22, 2007

To: National Surface Transportation Policy and Revenue Study Commission

From: Josh Golka, Representing the Professional Engineers in California Government

Subject: Ensuring Safe, Cost Effective Expenditures of Federal Transportation Funds

---

Federal transportation funds are being wasted at an alarming rate, and the pace is increasing! In California, 2006 was the year of infrastructure. SAFETEA-LU increased federal transportation funding in California and nationally. Then, in November, California voters approved a $19.9 billion infrastructure bond, plus ensured that another $1.8 billion per year in sales tax on gasoline will be used for transportation. In several counties, voters approved an increase in sales tax for transportation.

Unfortunately, on many projects, half of that money is being wasted on unsafe facilities with high maintenance and repair costs. As the "Big Dig" shows us, this is a national problem, not just one in California.

The culprit? Misguided contracting procedures.

Imagine, if you will, a procedure in which qualified engineers design a transportation facility -- either experienced state engineers or the most qualified engineering firm. Then, after a complete set of plans and specifications is developed, qualified contractors compete for the right to build the project, using a competitive bidding system that awards the contract to the lowest responsible bidder. Finally, the construction is inspected by engineers who work for and are loyal to the public, not a private firm pursuing the profit motive.

That system isn't hard to imagine. It has worked in California and elsewhere for decades.

Now imagine this system. A construction company is awarded a contract without competitive bidding. The construction company, not a public agency, selects the design firm. The construction company must submit an estimated price for doing the work. Because the project hasn't been designed yet, it is full of risks and uncertainties, which inflates the price. Finally, the construction company is allowed to hire inspectors who will tell the construction company if its work is acceptable. During construction, costs escalate rapidly.

HEADQUARTERS: 660 J Street, Suite 445, Sacramento, CA 95814 • (916) 446-0400
LOS ANGELES: 505 N. Brand Boulevard, Suite 650, Glendale, CA 91203 • (818) 500-9941
SAN FRANCISCO: 1 Sutter Street, Suite 800, San Francisco, CA 94104 • (415) 861-5720
TELEFAX: Headquarters (916) 446-0489; Los Angeles (818) 247-2348; San Francisco (415) 861-5360

That's called "design-build". It's an obvious recipe for disaster. It's a process which shouldn't work in theory, and without exception in California, hasn't worked in practice.

Every design-build project to date -- Routes 91, 73, 22, and 125 -- **have more than doubled in cost** from the original estimate. **None have been completed ahead of schedule.** Three out of four of those projects required substantial taxpayer bailouts, even though two of them were public-private partnerships which were supposed to place the risk on the private consortium, not the taxpayer. The fourth project was supposed to open last year, but still hasn't been completed, as the cost on Route 22 increased from $270 million when it was supposed to use competitive bidding; to $390 million when the contract was awarded for design-build; to more than $550 million and still counting.

You will hear from the Orange County Transportation Authority that Route 22 is a success story, blaming everyone except themselves and the process they used for the doubling of the cost. They will also admit that $207.5 million was spent by the taxpayers to buy out the public-private partnership on Route 91, which was constructed for $139 million. They don't mention that the project was supposed to cost $57 million. In 1995, the maximum toll on that project was $2.50, which the Orange County Register reported as "the nation's highest per mile toll". Today, the maximum toll is $9.25.

The collapse of Hollywood Boulevard during the Red Line Subway construction in Los Angeles several years ago was another example of private design, private construction, and private inspection, with almost unbelievable construction defects. Ten thousand defective welds on the earthquake retrofitting of the 8-805 Interchange in San Diego was another disastrous example of private inspectors. Of course, the design, construction, and inspection failures by private firms on Boston's "Big Dig", along with the death of a woman passenger in the tunnel underneath the collapsing concrete slab, is but the latest sorry legacy for that project, completed years late at five times the original cost.

On Monday, the LA Times reported on the Gold Line elevated station. The same firm that built the "Big Dig" built that one. Chunks of concrete are falling off. Failures are being attributed to shear keys built shorter than they were designed, deviations in steel reinforcing bars, and other problems. As is typical in these projects, the contractors point the finger at the public agency, in this case MTA, which has agreed to make the necessary repairs, even though MTA didn't design, build, or inspect the project.

Even when Caltrans awards construction contracts through competitive bidding, there is still a question regarding who will prepare the plans and specifications. Based on Caltrans data, **a state engineer costs $105,000 per year**, including pay, benefits, and overhead; **an outsourced engineer costs $193,000.** Nevertheless, despite the passage of Prop 1B last November, **Caltrans is still refusing to hire** even enough engineers to replace attrition, must less undertake

what the Legislative Analyst says is a crucial role in delivering $12 billion in additional highways requiring an additional 4800 Person-Years of staff. This refusal to hire guarantees that it will ultimately require nearly twice as many federal and state tax dollars to design and inspect these construction projects.

As reported in a recent New York Times editorial and article, the Federal Government is having the same experience. Outsourced services cost $200,000 per Person-Year, double the cost of using a federal employee. As Representative Henry A. Waxman of California recently observed, "Billions of dollars are being squandered, and the taxpayer is being taken to the cleaners" as a result of federal outsourcing.

In summary, the outsourcing procedures currently utilized by Caltrans and regional and local transportation agencies, particularly regarding design-build, have proven to be not only wasteful in every instance, requiring taxpayer bail-outs, but result in defective construction for which the taxpayers must foot the bill. It is time for the Federal Government, and all taxpayers, to go back to competitive bidding for construction contracts and construction inspection by those who work for the public, not the profit motive.

Bill of Rights
for Transportation Users

To Ensure Safe, Cost-Effective, Timely Project Delivery In the Public Interest, Taxpayers and Commuters Have the Following Rights:

BIGGER BANG FOR THE BUCK! Taxpayers should get their money's worth from their transportation dollar: the most projects, at the lowest costs, delivered on time.

SAFETY FIRST! Public safety should not be for sale. To ensure public safety, construction inspection should be performed by public servants accountable to the public, not private contractors motivated by profit.

COMPETITIVE BIDDING! Construction contracts for transportation projects should be competitively bid, not subjectively selected.

TOLLS SHOULD BENEFIT TRANSPORTATION USERS! All tolls paid for transportation should be reinvested in the system for the public's benefit, not siphoned off for private profit.

LINK LIABILITY AND RESPONSIBILITY! If an agency will be liable for a transportation facility, it should be responsible for designing, constructing and inspecting it.

January 2007

THE WRONG WAY TO DELIVER TRANSPORTATION PROJECTS:

WRONG WAY

Design-Build, Public-Private Partnerships and Outsourcing Engineering Work Have Already Failed in California

DO NOT ENTER

Legislative proposals to authorize design-build procurement, expand so-called public private partnerships, and increase outsourcing of state engineering work threaten public safety, eliminate competitive bidding, and waste bond dollars. In short, they've been complete failures in California and around the country.

Design-Build Procurement Eliminates Competitive Bidding and as a result greatly increases project costs. By allowing private contractors to inspect their own work, design-build also threatens public safety. In California, State Routes 22, 73, 125 and 91 are all design-build projects that have been delayed, come in at twice the expected cost or required public bailouts.

Outsourcing Engineering Work Threatens Public Safety and Wastes Millions

Public-Private Partnerships (the Fancy Name for Toll Roads) Have Proven to be Taxpayer Rip-Offs in California. State Routes 125 and 91 – public-private toll roads – have required public bailouts and operate with some of the highest tolls in the country. If policy makers determine that toll roads are necessary, toll revenues should be reinvested in our transportation system and not be used to boost profits of foreign banks and multi-national consortiums.

Design-Build Procurement Eliminates Competitive Bidding

Outsourcing Engineering Work Threatens Public Safety and Wastes Millions. The 2007-2008 Budget calls for a $1.5 billion increase in transportation funding, yet it proposes reducing state engineering positions. By reducing staff, the administration is advocating outsourcing millions of dollars of state engineering work. The vast majority of this outsourced work will be inspection and oversight of state highway construction – including the inspection of the Bay Bridge Tower! This will **allow private inspectors to inspect the work of private contractors** – the same process used on Boston's disastrous and deadly Big Dig. Public safety should not be for sale.

Outsourcing this work will also waste critical resources. During a Budget Conference Committee hearing in 2004, the Department of Finance representative **testified that "it costs more money" to contract out engineering services.** Testimony that day found that the state pays $105,000 per year for a state engineer and $178,000 for a private consultant to do the same work.

Public-Private Partnerships (the Fancy Name for Toll Roads for Profit) Have Proven to Be Taxpayer Rip-Offs

For example:

SR 22 (Garden Grove Freeway). Orange County Transportation Authority's design-build project to build twelve miles of car-pool lanes on SR 22 was supposed to have been completed and open in 2006, but work continues in 2007. Since the decision was made to use design-build for the project, the cost increased from $271 million to $550 million!

SR 91 (Express Lanes). Constructed in 1995, the design build, privately owned Express Lanes runs through the middle of the congested Riverside Freeway. In 2002, the Orange County Transportation Authority had to buy the tollway because of an extraordinary non-compete clause that did not allow for improvements on the non-toll lanes. The result is that taxpayers were forced to "assume the turnpike's debt of $135 million and pay the company $72.5 million in cash," in part because design-build increased the cost from $57 million to $130 million.

SR 73 (San Joaquin Hills Tollway). According to the Los Angeles Times, on November 10, 2005, the SR 73 design-build tollway required a $1.16 billion bailout package by Orange County officials. The $1.5 billion design-build tollway opened in 1995 and has been "plagued by lower-than-projected traffic and revenue."

SR 125 (San Diego Toll Road). In 2003, this public-private partnership toll road was supposed to cost $360 million and be completed in 2006. Currently, costs have ballooned to $800 million and completion is nowhere in sight. 2006 legislation extended the tolls to be provided to the private entity by an additional ten years to help pay for the cost overruns, requiring the public to pay "hundreds of millions of dollars in additional tolls," according to the Department of Finance.

April 2007

State Route 22 HOV Lane Design Build Failure

	Estimated Cost	**Estimated Completion Date**
August 2002 Design-Competitive Bid-Build Estimate:	**$271 million**[1]	**Late 2006**[1]
August 2004 Design-Build Contract Award Amount:	**$390 million**[2]	**Late 2006**[2]
Current:	**$549.6 million**[3]	**Mid 2007**

NOTE: Although SR 22 was suppose to open on November 30, 2006, it missed its mark and Orange County taxpayers still get almost daily notifications of full freeway closures during overnight hours.[4]

---

[1] Caltrans SR-22 Project Report, August 2002 Construction Estimate
[2] Granite Construction Press Release, August 24, 2004
[3] Orange County Register Article, "22 Widening Still to Finish on Time," April 4, 2006
[4] OCTA Press Releases

April 2007

Route 91 Express Lanes Public-Private Partnership Failure

	Estimated Cost	Estimated Completion Date
July 1993 Design-Build "Fixed Price" Contract Award:	**$57 million**[1]	**Late 1995**[1]
December 1995 **Actual Cost:**	**$130 million**[2]	**December 1995**[2]

Consequence: Taxpayers were forced to buy out the express lanes for **$207.5 million;** OCTA assumed the Tollway's debt of $135 million and paid the company $72.5 million[3]

Tolls

1995 Tolls: 25¢ to $2.50 – "the nation's highest per mile toll"[4]

Current Tolls: $1.15 to **$9.50**[5]

---

[1] Center for Design Informatics, Harvard Design School 2002 Report, "State Route 91 Express Lanes"

[2] Cailfornia Department of Transportation Wedbsite, "AB 680 Private Toll Road Program," 8/29/2005

[3] The Orange County Register, "OCTA Acts to Relieve 91 Congestion – Board Votes to Buy Express Lanes," 11/26/2002

[4] The Orange County Register, "New Toll Road Fees Based on Traffic," October 24,1995

[5] The Orange County Register, "91 Freeway's Top Toll Hits Nearly $1 a Mile," April 6, 2007

April 2007

Route 125 Toll Road Public-Private Partnership Failure

February 17, 2000	
Initial Estimate:	**$260 million** / Early **2003**[1]
(San Miguel Road to Otay Mesa Road)	
May 2003	
Design-Build Contract:	**$270 million / Fall 2006**[2]
(SR 125 Tollway: San Miguel Road to Otay Mesa Road)	
("Gap and Connector")	**$90 million / Fall 2006**
March 2006	
(Both Extension and "Gap and Connector")	**$800 million / January 2007**[3]

As of April 11, 2007, SR 125 Tollway and "Gap and Connector" project is not completed. Info on the SANDAG Website still indicates the tollway will be open in "early 2007," with no more specific information given.

In 2006, SB 463 extended the tolls to be awarded to the private entity by an additional 10 years, requiring the public to pay "hundreds of millions of dollars in additional tolls," according to the Department of Finance[4]

[1] San Diego Union Tribune Article, "Toll Road's Environmental Record Mixed." February 17, 2000
[2] Washington Group International Press Release, "Washington Group-led Joint Venture Wins $270 Million Design-Build Contract for San Diego Toll Road." May 28, 2003
[3] San Diego Union Tribune Article, "Route 125 on Track for '07 Completion." March 4, 2006
[4] Senate Rules Committee Analysis, August 31, 2006

April 2007

San Joaquin Hills Tollway (Route 73) Design-Build Failure

	Estimated Cost	Estimated Completion Date
February 1988 Original Cost Estimate:	**$380 million**[1]	**Mid 1991**[1]
November 1992 Design-Build Cost Estimate:	**$778 million**[2]	**1995**[3]
November 1996 **Actual Cost:**	**$1.5 billion**[4]	**November 1996**[4]

Consequence: Taxpayers were forced to bail out the struggling tollway with **$1.16 billion** in loans and payments

[1] OC Register Article, "State Offers Aid for OC Toll Road," February 27, 1988
[2] OC Register Article, "Coastal Panel Oks Tollway's Wetlands Route," November 19, 1992
[3] OC Register Article, "Toll-Road Agency Displays Proposals for Laguna Canyon," October 18, 1990
[4] Los Angeles Times Article, "O.C. Shopping Centers Vie to Exploit Tollway," November 21, 1996

Testimony of John R. Njord, PE
Before the
Subcommittee on Highways and Transit
Of the
House Committee on Transportation and Infrastructure

Public Private Partnerships: Innovative Contracting

Tuesday, April 17, 2007, 10:00 a.m.
Rayburn House Office Building
Room 2167

John R. Njord, PE
Executive Director
Utah Department of Transportation
4501 South 2700 West
Salt Lake City, UT 84114-1240
(801) 965-4027

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to discuss Utah's experience with innovative contracting and public private partnerships.

Utah's Growing Needs

As the fifth fastest growing state in the union, Utah continues to experience rapidly expanding transportation needs. Our growth is compounded by the highly urbanized profile of the state. Eighty-eight percent of Utah's 2.6 million people live in urban areas, with most of that population living along the Wasatch Front – a narrow 125-mile corridor comprising the metropolitan areas of Salt Lake City, Ogden and Provo. Utah will add another one million people along the Wasatch Front alone by the year 2030. In addition, St. George City, located in the southwest corner of the state, is now the fastest growing metro area in the entire country. Consequently, while Utah faces challenges associated with an aging and deteriorating infrastructure, our greatest challenge is addressing growth and increasing congestion. In the face of these growing needs, Utah continues to pursue strategies that help meet our increasing needs, including new state financing tools and improved project delivery.

Innovative Contracting: Design-Build

The traditional design-bid-build process has served Utah and this country well for procuring transportation projects. It's a familiar and established way to deliver a project, ensuring that the design and final project are acceptable to the project owner, and for its suitability for competitive bidding. The overwhelming majority of Utah's current and future highway projects will be delivered under the traditional design-bid-build model. However, as appropriate, Utah is also embracing new and innovative methods to deliver projects and, possibly, help finance our state's future transportation needs.

Since 1997, when the Utah State Legislature approved comprehensive legislation authorizing the use of design-build, the Utah Department of Transportation (UDOT) has implemented design-build as an alternate project delivery method. Utah's most prominent example is the reconstruction of Interstate 15 through the heart of the Salt Lake Valley. Completed in the fall of 2001, the project reconstructed 17 miles of freeway, including 142 bridges, three major interstate junctions, eight single point urban interchanges, and implemented an Intelligent Transportation System and Utah's first High Occupancy Vehicle lanes, which were recently converted to High Occupancy Toll lanes. The $1.59 billion project would have normally taken 10 years but was completed in just 4.5 years and $32 million under budget, all while maintaining traffic flow throughout the valley.

Since then, the UDOT has used design-build to deliver 16 other highway projects statewide – representing less than one percent of the UDOT's total construction. Examples range from the $214 million reconstruction of I-15 currently underway in

Weber County, an $11 million project to reconstruct portions of Redwood Road in the Salt Lake Valley, and small highway projects with a value of less than $1 million, including installation of traffic signals. Additionally, the Utah Transit Authority, which operates transit services throughout Utah's major metropolitan areas, has employed design-build to accelerate delivery of light rail projects. Based on our successful use of this project delivery method, the Utah State Legislature has continued to support use of design-build and approved legislation last year that further streamlined the use of design-build where appropriate.

Design-build is not appropriate or beneficial for all projects. As stated earlier, the UDOT will continue to deliver the overwhelming majority of projects using the traditional design-bid-build process. However, design-build enables the UDOT to achieve the following objectives: complete the project in an accelerated time frame; reduce costs to the traveling public; ensure a fixed price for the project; and achieve acceptable quality. When used appropriately, design-build provides significant benefits. For example, use of design-build for the reconstruction of I-15 saved an estimated 60 million hours of delay throughout the Salt Lake Valley resulting in $500 million savings to the traveling public, and resulted in 2,321 fewer crashes with a total savings of $120 million associated with accident reductions. By accelerating project delivery, design-build also provides benefits for smaller projects. For example, using design-build, we're able to install new traffic signals two months faster than using traditional methods.

Innovative Contracting: Construction Manager / General Contractor

In addition to design-build, the UDOT is also employing use of Construction Manager General Contractor (CM/GC) under the SEP-15 Program. While commonly used in the vertical construction industry, CM/GC has been employed less often in the highway construction industry. We believe that CM/GC is another innovative contracting method that will allow us to accelerate project delivery for certain types of projects, such as bridge construction.

Under CM/GC, the project owner simultaneously hires both the design contractor and the building contractor. The advantage of CM/GC is that both contractors work together to develop and execute innovative design solutions. However, unlike design-build, the project owner retains full control of the project design throughout the design process. Currently, the UDOT has six CM/GC projects at various stages of development or completion for a variety of projects, including construction of a new roadway (Southern Corridor) and a new interchange (State Route 18), both outside of St. George City. In addition, the UDOT is working on a programmatic agreement with the Utah Division of the Federal Highway Administration that would allow the UDOT to implement twenty-four CM/GC federal-aid projects each year for two years on a pilot project basis. We will continue to monitor the results of CM/GC projects and determine whether, and to what extent, the UDOT will employ CM/GC in the future to improve project delivery.

Public Private Partnerships: Beyond Design-Build

Beyond design-build and CM/GC, Utah is willing to explore and consider use of other public-private partnerships to help meet our growing transportation needs. In the 2006 General Session of the Utah State Legislature, a bill was adopted that granted the UDOT comprehensive authority to enter into public-private partnerships for tollways. Under the bill, the UDOT is authorized to enter into a tollway development agreement with a private partner for one or all elements of a tollway — planning, design construction, operation, maintenance and financing. Further, the UDOT is authorized to consider and accept both solicited and unsolicited project proposals. Importantly, a tollway development agreement is approved by the independently-appointed Utah Transportation Commission, not by the legislature, to give the state greater flexibility to solicit, negotiate and accept public private partnership proposals.

Currently, Utah does not have any public private partnerships for tollways in the near-term. However, as a state, we must keep our options open and retain the opportunity to consider public private partnerships at all levels of project development and delivery if it is found to be appropriate for a particular project. Innovative project delivery through the use of design-build and CM/GC is a good step toward partnering with the private sector to help meet critical transportation needs, however, appropriate opportunities for further partnering with the private sector should be explored.

The Project Delivery Toolbox

As Utah's transportation needs grow, the state continues to pursue new strategies to help address our rising needs, including new state financing and project delivery tools. Beginning in the last decade, Utah has contributed significant state funding for highway construction, including a 10-year \$3½ billion dollar highway construction program that is nearing completion, and new legislative approval of an additional \$1 billion bond for highway capacity improvements. Further, the state recently authorized a local option sales tax which may be used by local governments for regionally significant transit, airport or highway projects. With this infusion of state funding, federal funds currently account for less than 15% of Utah's state highway program.

In addition to the increased state funds Utah is investing in our transportation infrastructure, we must also actively pursue opportunities to accelerate and improve project delivery. Under the federal-aid program, states are charged with the responsibility to deliver transportation projects. As a state, we must have every available tool in our toolbox to help ensure we can deliver critical projects. By matching the right application of public private partnerships to the right project, we can use this tool to help us deliver quality transportation projects that benefit our economy through more efficient movement of people and goods.

Conclusion

Congress has taken steps to expand public-private partnership opportunities through the federal-aid program. I hope that future actions will expand those opportunities further, providing states with the tools and flexibility to customize the best project delivery tool for each project.

Mr. Chairman and Members of the Subcommittee, thank you again for the opportunity to testify today regarding Utah's experience with innovative contracting and public private partnerships.

Statement of James D. Ray
Chief Counsel and Acting Deputy Administrator
Federal Highway Administration
U.S. Department of Transportation
Hearing on Innovative Contracting in Public-Private Partnerships
Before the
Committee on Transportation and Infrastructure
Subcommittee on Highways and Transit
U.S. House of Representatives

April 17, 2007

Chairman DeFazio, Ranking Member Duncan, and Members of the Subcommittee, thank you for the opportunity to testify today on the topic of innovative contracting in public-private partnerships.

Introduction

Secretary Mary Peters has said: "Congestion is endangering our freedom, our economy, and our independence." We must make the most of our existing network and resources. The purpose of the U.S. Department of Transportation's *National Strategy to Reduce Congestion on America's Transportation Network* (often referred to as the "Congestion Initiative") is to help State and local governments demonstrate innovative ideas for reducing congestion. One of the elements of the Congestion Initiative is to remove barriers to private sector participation in the construction, ownership, and operation of transportation infrastructure. Innovative contracting is one means by which we can increase private sector involvement.

In traditional Federal-aid highway construction contracting, cost is generally the one criterion that determines a winning bid. Section 112(b)(1) of title 23, United States Code, requires highway construction contracts to be awarded competitively to the lowest responsive bidder. A State must use competitive bidding procedures, unless it demonstrates that some other method is more cost effective or that an emergency exists. Similarly, 23 U.S.C. 112(b)(2) requires engineering service contracts to be awarded using qualifications-based selection procedures. These two requirements hinder the use of newer, more quality-oriented contracting techniques. For example, since design and construction contracts must be competed in different ways under these requirements, design-build contracts were essentially prohibited.

In recent years, as State highway agencies strive to meet customer needs, factors other than cost have also emerged as important factors in awarding highway construction contracts. Quality, delivery time, social and economic impacts, safety, road user impacts, life-cycle costs, innovative construction and management techniques, and better use of improved technologies are all factors that States have considered. Innovative contracting techniques have provided States with greater flexibility to address these concerns and encouraged contractors to be more creative in addressing the States' needs. We believe

that this increased flexibility and creativity will benefit the entire transportation community. In particular, we believe that innovative contracting can help to reduce congestion on our Nation's highways.

More flexible procurement arrangements are often a key part of public-private partnerships. Although the emphasis of discussion concerning public-private partnerships has focused on private financing, public-private partnerships also can involve contracting methods that increase private-sector involvement. Using innovative contracting techniques, the private sector assumes those project risks that it can better manage, thereby increasing the speed and efficiency of project delivery. The Federal Highway Administration (FHWA) has undertaken a number of activities to explore and promote the use of innovative contracting techniques by both States and the private sector.

Special Experimental Project No. 14 (SEP-14)

Since 1990, FHWA has been supporting the evaluation of nontraditional contracting techniques through Special Experimental Project No. 14, Innovative Contracting (SEP-14), to improve efficiency in highway project delivery. In 2002, FHWA changed the name of SEP-14 from "Innovative Contracting" and "Alternative Contracting" to reflect that many of the contracting practices which had been the focus of experimentation have become widely used. The concept of SEP-14 originated in 1988 with the establishment of a Transportation Research Board (TRB) task force to evaluate innovative contracting practices. The TRB task force issued a number of recommendations and requested that FHWA establish a Special Experimental Project to evaluate these recommendations.

In response, SEP-14 was developed, under FHWA's authority to conduct research in transportation planning and development (23 U.S.C. 502), to provide the States with a vehicle to explore new concepts in construction contracting. Within the Federal-aid highway program, there is some degree of flexibility. Under SEP-14, States submit a work plan to FHWA requesting to test an innovative contracting technique on a particular project. State work plans generally are approved on a project-by-project basis. The objective of SEP-14 is to assess innovative contracting practices that might reduce the life-cycle cost of projects, while maintaining product quality. Although most projects undertaken under SEP-14 have not involved private-sector financing, innovative contracting often involves new and expanded roles for the private sector and, in that way, promotes public-private partnerships.

FHWA continues to use SEP-14 to evaluate a number of innovative contracting techniques to determine if these techniques should be mainstreamed. Several techniques evaluated early in the life of SEP-14 have been adopted as standard practice. In this regard, SEP-14 has proven successful in identifying new contracting techniques to improve the time and cost of project delivery. After evaluation in many States, four SEP-14 experimental techniques have become accepted practice: design-build, cost-plus-time bidding, lane rental, and warranty clauses. These practices have not only resulted in time

and cost efficiencies for traditional highway projects, but also have facilitated greater private sector involvement in project delivery.

Design-Build

One of the biggest changes that has resulted from SEP-14 so far is the design-build contracting method. Design-build allows the contractor maximum flexibility for innovation in the selection of design, materials, and construction methods. With design-build procurement, the contracting agency identifies the end result parameters and establishes the design criteria. The prospective bidders then develop design proposals that optimize their construction abilities. The submitted proposals may be rated by the contracting agency on factors such as design quality, timeliness, management capability, and cost. These factors may be used to adjust the bids for the purpose of awarding the contract.

As I noted at the outset of my testimony, before the law was amended in 1998 by the Transportation Equity Act for the 21st Century (TEA-21), the use of design-build procurement was effectively prohibited on Federal-aid projects. However, beginning in 1990 under SEP-14, States applied to FHWA to use and evaluate design-build on a project-by-project basis. Based on the experience from over 300 experiments, the Department recommended changing the law to permanently allow these types of contracts. Congress agreed and TEA-21 provided statutory authority for States to use design-build on Federal-aid projects after FHWA issued a final rule describing the approval criteria and procedures for utilizing the design-build method. FHWA issued the final rule on design-build on December 10, 2002 (67 FR 75901).

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) made changes to the design-build statute and required FHWA to make changes to the regulation. Section 1307 of TEA-21 defined qualified design-build projects as projects with estimated total costs over $5 million for ITS projects and $50 million for other projects. SAFETEA-LU eliminated these dollar thresholds for all projects. Additionally, the design-build rule, issued as a result of TEA-21, prohibited the release of a design-build request for proposal (RFP) until the requirements of the National Environmental Policy Act (NEPA) have been met. Section 1503 of SAFETEA-LU requires FHWA to issue a rulemaking that allows State transportation departments to issue RFPs, award design-build contracts, and issue notices-to-proceed for preliminary design work prior to the conclusion of the NEPA process. FHWA issued a notice of proposed rulemaking to implement this statutory requirement on May 5, 2006 (71 FR 30100), and plans on issuing a final rule early this summer.

There are a number of reasons why design-build may be the preferred method to procure a highway project. The use of design-build can result in cost savings, price certainty, and time savings for the State. From the private sector's perspective, design-build gives the contractor greater flexibility to achieve the project's purpose. The State, the private sector, and users of the facility benefit from the opportunity for more innovation.

Cost savings from design-build contracts are generally attributed to a closer working relationship between the designer and contractor, who are the "design-build team." The team approach allows the designers and contractors to resolve design and constructability issues before they arise in the field. Design-build allows for a more detailed and effective value engineering process during preliminary engineering. Also, having the design-builder lead this effort provides a greater opportunity to incorporate construction cost efficiencies and optimize life-cycle costs for the project.

Under the traditional design-bid-build process, there are typically separate contracts for design and construction as well as a multitude of contracts for various phases of construction work. The State assumes the risk of increased costs and delayed schedules, because it is responsible for accepting the work before it passes the project from one contractor to the next. State departments of transportation may prefer to use design-build for certain types of projects over the traditional design-bid-build approach, because projects can be procured with greater price and schedule certainty using design-build rather than traditional design-bid-build contracts.

Greater schedule certainty may occur with design-build, because a design-builder generally will conduct constructability and scheduling reviews in preparing its design-build proposal. The design-build team knows it must be competitive on price, quality, and schedule in order to be the successful proposer. A proposal that demonstrates increased attention to the details of constructability and schedule will enhance its potential for being selected.

Under the design-build approach, greater price certainty is achieved, because State agencies negotiate fixed prices for these contracts based on the design-build team achieving a particular result within a set period of time. Under a design-build contract, the design-builder is responsible for the final design and any necessary changes as the project develops. The lump-sum, fixed-price approach for most design-build contracts eliminates most change orders, because the design-build team is responsible for adapting and solving most unanticipated challenges.

The potential time savings in the overall project delivery schedule is another significant benefit from the State's perspective. Since design and construction are performed through one procurement, construction can begin before all design details are finalized. For example: pile driving could begin while bridge lighting is still being designed. Because both design and construction are performed under the same contract, claims for design errors or construction delays due to design errors are not allowed and the potential for other types of claims is greatly reduced.

TEA-21 required FHWA to prepare a report to Congress that assessed the design-build method. The report, entitled *Design-Build Effectiveness Study*, was sent to Congress in January 2006. A survey of managers of design-build projects, conducted in connection with the report, indicated that, on average, the design-build method reduced

the overall duration of a project by 14% and maintained the same level of quality as compared to the tradition design-bid-build contracts.

From the private sector's perspective, by allowing the contractor to optimize its work force, equipment and scheduling, the design-build concept opens up a new degree of flexibility for innovation. The contractor also has the ability to decide the best methods and materials for the project subject to the State's oversight. Innovative technologies and techniques relating to construction materials and equipment as well as design methods can result in reducing the time and cost to complete the project. This increased flexibility means that the contractor must also assume greater responsibility for any schedule or cost overruns.

One of the concerns that have been raised is that small firms may be impacted negatively by the use of the design-build method. The concerns are that small businesses may not be able to participate in design-build projects, particularly as the lead or prime contractor, due to the large size and scale of the projects, more stringent qualification requirements, and higher bonding requirements. The information obtained for the report to Congress on design-build indicated that the percentage of design-build project costs going to small businesses are almost the same, on average, as the amount under the traditional design-bid-build approach. Thus, these results suggest that small businesses are not disadvantaged by the use of design-build.

Cost-Plus-Time Bidding

SEP-14 resulted in the mainstreaming of cost-plus-time bidding. Cost-plus-time bidding, more commonly referred to as the A+B method, is a bidding procedure in which the low bidder is selected based on a monetary combination of the contract bid items and the time needed to complete the project or a critical portion of the project. Under the A+B method, each bid submitted consists of two components. The "A" component is the traditional bid for the contract items and is the dollar amount for all work to be performed under the contract. The "B" component is a "bid" of the total number of calendar days required to complete the project, as estimated by the bidder.

The bid for award consideration is based on a combination of the bid for the contract items and the associated cost of the time, according to the formula: (A) + (B x Road User Cost / Day). This formula is only used to determine the lowest bid for award and is not used to determine payment to the contractor. A disincentive provision, that assesses road user costs, is incorporated into the contract to discourage the contractor from overrunning the time "bid" for the project. In addition, an incentive provision usually is included to reward the contractor if the work is completed earlier than the time bid.

Under SEP-14, 27 States and D.C. used and evaluated the A+B method. States that have used A+B have generally reported good results. Contract times have been reduced, costs have been acceptable and quality has been maintained. In particular,

the A+B method has proven to be an effective technique for reducing the impacts of critical projects that would result in long delays for road users.

After a five-year evaluation period, FHWA issued a policy memo on May 4, 1995, (http://www.fhwa.dot.gov/programadmin/contracts/050495.cfm) that announced the A+B method is an operational technique, and is no longer considered to be experimental.

Lane Rental

Like cost-plus-time bidding, the goal of the lane rental concept is to encourage contractors to minimize road user impacts during construction. Including a lane rental provision in a contract encourages contractors to schedule their work to keep traffic restrictions to a minimum, in terms of duration, the time of day, and number of lane closures. The lane rental concept has merit for use on projects that significantly impact the traveling public; major urban area projects are prime candidates for this approach.

Under the lane rental concept, a provision for a rental fee assessment is included in the contract. The lane rental fee is based on estimated cost of delay or inconvenience to the road user during the rental period. The fee is assessed for the time that the contractor occupies or obstructs part of the roadway and is deducted from the monthly progress payments. The rental fee rates are stated in the bidding proposal in dollars per lane per time period, which could be daily, hourly or fractions of an hour. The contractor is free to determine its construction schedules, but must pay the lane rental fee described in the bidding proposal. The rental fee rates are dependent on the number and type of lanes closed and can vary for different hours of the day. For example: the rush hour periods of 6:30 to 9:00 am and 3:00 to 6:00 pm could have an hourly rental fee of $2000 for closing one lane, while a lane could be closed at any other time at a rental fee of $500 per hour.

Under SEP-14, five States evaluated the lane rental technique. After a five-year evaluation period, FHWA issued a policy memo on May 4, 1995, (http://www.fhwa.dot.gov/programadmin/contracts/050495.cfm) that announced lane rental is an operational technique, and is no longer considered to be experimental.

Warranty

Warranty clauses provide assurance that a product used on a highway project will serve its useful life without failure. If failure does occur, the contractor, not the State, is responsible for the repair or replacement of the product. The premise behind a warranty clause is that a contractor is more likely to contribute to a high quality product in order to reduce future repair and maintenance costs. Thus, the major benefit of a warranty is improved life-cycle costs.

Warranties have been successfully used in other countries and by some States on non-Federal-aid projects, to protect investments from early failure. Prior to 1991, the

FHWA had a longstanding policy that restricted the use of warranties on Federal-aid projects to electrical and mechanical equipment. It was believed that warranties would include routine maintenance work. Since the use of Federal-aid funds for routine maintenance is prohibited by law, FHWA had restricted the use of warranties to avoid Federal-aid funds participating in maintenance costs.

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) allowed States to use their own design, construction, maintenance, and operation standards for Federal-aid projects located off the National Highway System. For projects under these conditions, warranty clauses were allowed to be used in accordance with State procedures. FHWA also allowed States to evaluate the use of warranties under SEP-14. On August 25, 1995, FHWA issued a final rule (23 CFR 635.413) allowing the use of warranty clauses for a specific construction product or feature. Routine maintenance items are still not eligible for Federal-aid highway funding. Additionally, warranties for items not within the control of the contractor are prohibited.

Special Experimental Project No. 15 (SEP-15)

Building on the success of SEP-14, on October 6, 2004, FHWA issued a notice in the Federal Register (69 FR 59983) announcing the establishment of Special Experimental Project No.15 (SEP-15) to explore alternative and innovative approaches to the overall project development process. While FHWA has long encouraged increased private sector participation in Federal-aid projects, SEP-15 allows FHWA to explore actively much needed changes in the way we approach the delivery of highway projects to further the Administration's goals of improving safety and reducing congestion. SEP-15 is designed to increase project management flexibility, encourage innovation, improve timely delivery of project construction, and generate new revenue streams for Federal-aid highway projects.

Like SEP-14, SEP-15 allows States to apply to FHWA for conditional approval to test innovative approaches to the project development process on a project-by-project basis. FHWA approval is conditional, because there are many evaluation points along the project life at which times FHWA may withdraw its approval. A State first must submit a proposal to FHWA. FHWA either accepts or rejects each experiment within the proposal. If FHWA accepts some or all of the proposed experiment, an early development agreement is negotiated with the State. The early development agreement identifies the parameters for the experiment, performance measures that will be used to evaluate the experiment, any stop points for the experiment, and a description of what should be included in the final report that analyzes the experiment.

One of the four areas of project delivery that SEP-15 seeks to address is contracting. SEP-15 builds on SEP-14's approach to innovative contracting. The difference between SEP-14 and SEP-15, is that the SEP-15 projects are focused on evaluating the use of conditional Federal approval earlier in the project development process than the typical SEP-14 project. Under SEP-15, States have the flexibility to propose innovative procurement ideas. However, the proposal must describe how the

procurement method will encourage competition; what effect the method might have on other Federal and State laws, such as environmental laws; how the method will provide for adequate government oversight and control to protect the public interest; and how the method will meet the goals of SEP-15. However, SEP-15 may not be used to experiment with authority outside of title 23, U.S.C., nor can it be used to experiment with State law. Applicants must fully comply with all applicable State and Federal laws and regulations, other than areas under title 23 identified for experimentation. Additionally, experiments are conducted with close oversight and monitoring by FHWA. Thus, SEP-15 will allow for innovations in project delivery, while maintaining FHWA's stewardship responsibilities to protect taxpayers and the environment.

An example of a current SEP-15 method being evaluated is the procurement process being used for the Oregon Innovative Partnerships Program, under which Oregon identified three projects for development. One of the experiments Oregon proposed is a procurement approach under which the price for final design and construction will be negotiated with the developer using an "open book" approach, allowing an analysis to be performed to confirm that the price is reasonable. The design-build rule generally contemplates that a proposed lump sum price for design-build services will be a factor in contractor selection, thus allowing a competing price proposal to be used as the basis for determining price reasonableness. FHWA gave Oregon conditional approval to proceed with this approach, but continues to monitor whether this approach is adequately ensuring competition and a reasonable price.

SEP-15 also has proven successful in educating FHWA about potential issues with regard to design-build. Prior to the enactment of SAFETEA-LU, FHWA granted Texas and Oregon conditional approval to issue an RFP for a design-build contract prior to the completion of the NEPA process. In negotiating Early Development Agreements with both Texas and Oregon, FHWA worked out many issues related to the relationship between design-build and the NEPA process. This knowledge helped in the development of the design-build rulemaking required by SAFETEA-LU, which will allow issuance of RFPs, awarding of contracts, and issuance of notices-to-proceed for preliminary design work prior to the conclusion of the NEPA process. However, the rulemaking will still prohibit a design-build contractor from proceeding with final design and construction prior to the completion of the NEPA process.

Conclusion

Our nation faces challenges at the Federal, State, and local levels in addressing our mobility needs. Innovative contracting techniques are one method by which transportation agencies can address these needs in a cost-efficient and timely way. These innovative contracting techniques also can lead to increased involvement of the private sector. Ultimately, we believe that innovative contracting can help to reduce congestion. By using its authority to conduct reasonable experiments, FHWA can assess new techniques as a prelude to proposing permanent statutory changes or considering regulatory changes. FHWA will continue to explore and evaluate innovative contracting methods, while protecting the public interest.

Mr. Chairman, Members, thank you for this opportunity to testify. I will be pleased to answer any questions you may have.

Testimony for the House Committee
On Transportation and Infrastructures
Subcommittee on Highways and Transit

By

Richard Thomas
Director, Government Affairs
Ames Construction, Inc.
President, Minnesota Transportation Alliance
2000 Ames Drive
Burnsville, MN 55306
952-892-8675

My name is Richard Thomas. For the last 16 years I have served as Director of Government Affairs at Ames Construction. In that role, I have been involved with transportation policy at the local, state and federal levels.

I am currently president of the Minnesota Transportation Alliance and I serve on the Board of Directors for the Center for Transportation Studies at the University of Minnesota.

Ames Construction is a heavy civil and transportation contractor with an annual volume of work of between $500-600 million annually. We have permanent offices in Burnsville, Minnesota, Denver, Colorado, Salt Lake City, Utah, Phoenix, Arizona and Carlin, Nevada. We build airports, roads, bridges, dams and rail projects for public and private owners across the U.S. We are family owned and have been in business since 1960.

This morning I have been invited to share with the Committee some of the challenges facing small and mid-size firms when public transportation agencies use non-traditional contracting practices.

Our nation's infrastructure is aging rapidly and most states have had a difficult time funding their backlog of needed transportation projects. This has led to a whole host of ideas to finance and deliver needed projects quickly and add value to those delivery methods. Many of these new delivery methods have great potential to strengthen our transportation procurement system, but they also bring with them new challenges particularly for small and midsize construction firms.

One of the biggest trends in the transportation industry over the last decade has been the move toward larger projects with extended durations. These projects are typically in the $250 million - $1.5 billion range. A few are public- private partnerships, but most are state or regional projects delivered by the traditional design-bid-build method, or by the newer design-build method.

The biggest challenge facing small and midsize contractors is not performing the actual work on these projects but rather in getting the opportunity to compete to do the work. Mega projects require contractors to get mega bonds and very few sureties are willing or able to assume the risk exposure for these large projects. In fact, any single surety is generally unwilling to accept exposure greater than $250 million under any given bond. With co-surety and the right contractor team, larger bonds can be provided but this in effect limits the bidding on these projects to only a few large firms.

This is further compounded by the trend towards shifting the risks associated with mega projects to the contractor. Warranties are good example of this. Many owners want extended warranties on projects (3-5 years). It is understandable that they desire that security, however that security comes at a price. Warranties require larger bonds with a longer duration that drive up the cost of the project and they also serve as a barrier to small and mid-size contractors who have less ability to secure those bonds.

Most major projects and private-public partnerships use the Design-Build method of construction. Design-Build has many advantages.

- It is the fastest delivery method.
- A firm cost of the project is established before significant financial and time commitments are made.
- The owner can make well informed decisions regarding design, quality and cost throughout the design process.
- There is a single source of responsibility for the entire project.
- It encourages more innovation.
- It reduces the number of claims

Design-Build has its limitations as well. The first is its subjectivity. Unlike Design-Bid-Build which takes the lowest responsible bid, the Design-Build method is set up to select the design builder whose proposal scores the highest on the evaluation criteria. Because the evaluation criteria must include the human-element it cannot be completely free of subjectivity.

The second Design-Build limitation is the qualification barriers that contractors must overcome to bid on these projects. In the states that we work in, most of our competitors have a lot of road and rail building experience. However, on most Design-Build projects the only experience that the evaluators look at is Design-Build experience. This means that local contractors are often denied the opportunity to compete on transportation projects that they would have been able to bid if they were awarded under the traditional system of design-bid-build. This is a problem even for larger firms with D/B experience like ours. Despite the fact that we have successfully completed many large rail projects (Design-Bid-Build), we have had situations where we failed to even make the short list on Design-Build rail projects because of our lack of Design-Build rail experience. This situation leads to a vicious "Catch -22" for contractors trying to get into Design-Build in

that they need experience to be able to compete, but can't get that experience without being allowed to compete.

Another major obstacle for contractors on Design-Build projects is financial net worth requirements. These Design-Build projects with net worth requirements disqualify many contractors from competing regardless of their ability to deliver the project. I have seen cases where contractors were disqualified from being selected on Design-Build projects due to net worth requirements despite the fact that they had successfully completed far larger projects. Financial net worth requirement should not be required provided the proposer can obtain 100% payment and performance bonds and the ability to finance the work.

My final point on Design-Build is the relationship between price and the project's technical score. In Minnesota when we drafted the state's Design-Build law we ensured that price would always be a major factor in awarding a project. When owners put too much emphasis on the non-construction elements of a proposal the result is a process that is more akin to a beauty contest. This all too often excludes good proposals and adds to the cost of the project. To date every Design-Build project in Minnesota has been awarded to the team that had the lowest bid.

In closing I want to thank the Committee for the opportunity to speak today. Time did permit me to get into great detail on these issues but I am more than happy to answer any questions that the Committee may have.

Testimony of
Paul Yarossi
President, HNTB Holdings Ltd
Before the
Subcommittee on Highways and Transit
Committee on Transportation and Infrastructure
U.S. House of Representatives

Hearing on "Innovative Contracting in Public-Private Partnerships"

April 17, 2007

Thank you for the opportunity to provide testimony regarding innovative contracting methods. New contracting methods are becoming increasingly relevant as we look for innovative ways to provide efficient transportation services with limited resources. An efficient transportation system is vital for America's economic growth and quality of life.

BACKGROUND ON HNTB

I am Paul Yarossi, president of HNTB Holdings Ltd. I have spent more than 30 years in the transportation industry. I also serve as co-chair of the American Road and Transportation Builders Association's SAFETEA-LU Reauthorization Task Force. This task force will develop the association's legislative agenda for the next reauthorization of the nation's federal highway and transit programs.

HNTB is an engineering, planning and architecture firm with a 93-year history of pioneering next-generation solutions for the nation's most challenging transportation issues. We are a national infrastructure firm with more than 3,000 professionals in more than 60 offices throughout the United States.

HNTB is a national leader in working with clients on innovative contracting methods including design-build and P3's. For design-build, in California HNTB was both engineer of record and prime consultant on three out of four design-build contracts developed for the Bay Area Rapid Transit District's extension to the San Francisco International Airport. The project was an FTA-sponsored Turnkey Demonstration Design-Build Project, and BART's first-ever design-build project.

In Minnesota, HNTB served as the general engineering consultant to create a statewide design-build program for the Minnesota Department of Transportation. For the Georgia Department of Transportation, HNTB served as the designer for the state's I-95 widening projects, which was Georgia's first foray into design-build. In Missouri, HNTB is providing professional services to the Missouri Department of Transportation for the I-64 reconstruction design-build, the first design-build project in Missouri.

For P3's, HNTB is the lead consultant involved in all activities related to the development, review and/or implementation of P3 projects across the state of Georgia

We are leading the Texas Department of Transportation's corridor engineering team for the Trans Texas Corridor Oklahoma to Mexico/Gulf Coast Element, which is being implemented under the first public-private partnership, or P3, program in Texas

We also have been called upon to advise departments of transportation and legislators on the growing challenge of developing our transportation system.

STATE OF TRANSPORTATION

Not since the inception of the interstate system have the country's growing transportation needs outweighed the available funding across the states. This challenge has created change among our client organizations in terms of their increasing reliance on consultants to deliver programs; consolidating and prioritizing programs; bringing in private dollars through P3s and using innovative techniques, such as design-build.

Essentially, given the revenue and staff available, departments of transportation and transportation owners across the country cannot afford to maintain their existing transportation system let alone build new capacity within current funding levels.

There is no silver bullet that will solve these financial problems. However, new and innovative ways to finance, design, build, operate and maintain transportation facilities must be part of the solution.

DESIGN-BUILD

In this industry we are seeing a growing number of states adopt design-build methods. The fundamental element of design-build delivery is that one entity assumes responsibility for the majority of the design and all of the construction. This entity may be a single firm, a consortium, a joint venture or other organization. However, most design-build is accomplished through a teaming of unrelated firms.

The primary benefit generally attributed to the design-build delivery method is the achievement of design and construction speed and economy, which results from the combination of construction and design talent at the outset of the project. This allows the design to be tailored to specific versus generic construction methods, and the resulting design is adapted to the contractor's best methods and skills. Also, a stronger incentive toward economy exists during the design process if competitive procurement is required.

A secondary benefit of design-build is cooperative problem solving during construction, which is often not the case for conventional design-bid-build projects. Design-build offers single-point responsibility, including removal of the owner from mediating disputes between the designer and constructor.

By definition, design-build eliminates the separate responsibilities for the design and construction and sometimes includes financing and operations. Its rise in popularity can be attributed to a number of perceived advantages over the traditional methods, such as:

- Single source responsibility and simplified owner role
- Reduced number of resources required from owner
- Less cost escalation as a result of fewer claims (design errors and omissions are one)
- Time savings since design and construction are done concurrently
- Increased possibility of innovation
- Private financing of needed public works when public funding is lacking

EXAMPLES OF DESIGN-BUILD SOLUTIONS

I-15 in Salt Lake City, Utah: Using a design-build approach, the Utah Department of Transportation completed the 17-mile reconstruction of I-15 in July 2001. The project was completed in four and a half years at a cost of about $1.63 billion. *At the project opening celebration UDOT handed the Governor of Utah a check for $30 million because the project was completed under budget by using design-build delivery.*

Missouri Department of Transportation's I-64 Reconstruction: HNTB is assisting MoDOT with the I-64 reconstruction in St. Louis, Missouri, which is a $535 million, 12-mile program - and the first design-build project in Missouri. *The original cost estimate to design and construct the project was over $600 million. Because of MoDOT's innovative design-build approach, essentially all improvements included the original cost estimate are being provided for $420 million.*

Minnesota Statewide Design-Build Program: HNTB served as the general engineering consultant team to create a statewide design-build program for the Minnesota Department of Transportation. Since 2002, MnDOT has awarded five best value design-build projects totaling more than $650 million.

Bay Area Rapid Transit to San Francisco International Airport Extension: The extension included eight miles of underground subway, and more than one mile of aerial bridge structures. The $730 million project was BART's first-ever design-build project.

Caltrans: Design-build is a popular and successful project delivery option in the state of California, although Caltrans has not yet adopted it as an official project delivery method. Examples of design-build projects, in addition to BART, include the Alameda Corridor Trench and Pasadena Gold Line in Los Angeles and the San Joaquin and Eastern Transportation Corridors in Orange County.

Common elements in making these projects successful were repetitive type of work and very common structure types. This type of a project allows the owner to bid the job based on preliminary design completed to the 15% level with the design-build contractor, then producing the final design using their own engineer. Risks to prospective contractors are fairly nominal as they usually know this type of work very well and have sufficient information on the plan drawings to estimate and submit bids keeping their risk factors at a reasonable level.

DESIGN-BUILD LESSONS LEARNED

Many factors must be considered when determining the best procurement method for any given project. Transportation agencies should explore design-build based on the project's goals, complexity, funding, design intent and responsibility and risk allocation. Defined contract documents are essential so that objectives are spelled out. Design-build thrives in situations where designers and design-builders have a fair degree of latitude in determining the solution to a given problem or situation.

The most commonly known advantage of design-build is time savings. Design-build generally allows construction to begin sooner with final project delivery in a shorter period of time compared to traditional project delivery methods. This is primarily because the design and construction can proceed concurrently, and the design and construction interface is managed by a single entity.

In addition, design-build projects typically see less cost escalation during the course of the project, primarily because the primary sources of claims, design errors and omissions or design/construction interface issues are removed from the owner's realm of responsibility. Generally, the more flexible owners are in their design-build approach the more innovative design-builders are resulting in owner expectations being exceeded.

However, design-build is not a cookie-cutter approach for all projects and it will not close the gap between our significant transportation infrastructure needs and funding.

PUBLIC-PRIVATE PARTNERSHIPS

Another trend in innovative contracting is public-private partnerships, or P3s. As transportation agencies continue to seek solutions to funding shortfalls, we are seeing a growing reliance on the private sector. Departments of transportation are relying on the private sector to provide more services and help fund projects, both in terms of new construction and the maintenance of current infrastructure. With this we are seeing a rise in P3s as another form of contracting innovation.

Essentially, P3s are strategic partnerships between an owner of a transportation facility, generally the state government and a private sector developer. The owner awards a concession or a lease to a developer to finance, design, build, operate, toll and maintain a highway, bridge, transit or railway line over a specified period of time. Partnership is the key word in these contractual arrangements. Partnerships are formed to accelerate project development; improve the cost-effectiveness of project and service delivery; and preserve transportation infrastructure.

But as we turn toward P3s and design-build, we need to proceed in a very deliberate, systematic way with an overall vision of the future transportation system. The focus of P3s should be to reduce congestion and manage traffic demand not just to lease existing facilities for quick cash. And design-build should be considered for those complex projects where time and money can be saved with minimal disruption to quality of life.

Although both are innovative methods, it is important to keep in mind that some of these techniques are not new. The United Sates was built by P3s. For example, in the 19th century there were more than 2,000 charters for private companies to own or operate toll roads or bridges. Today, nearly two dozen states, such as Oregon, Texas, Virginia, Georgia and Florida, have enacted legislation allowing P3s to finance transportation projects, and several others have new laws pending.

EXAMPLES OF P3 SOLUTIONS

Georgia: The state of Georgia adopted P3 legislation and has been inundated with un-solicited proposals. It took a step back, modified the legislation and is developing a master plan of managed lanes and truck-only lane systems to be built by P3s. HNTB is working with the state to create the master plan and then evaluate and contract the individual P3 projects to build the system.

Missouri: Missouri is introducing its Safe and Sound Bridge program which is a P3 to rehabilitate and maintain more than 800 deteriorated bridges. It includes the initial financing. This does not require a user fee (toll) and demonstrates that P3's can serve states purely as a financing mechanism. This is a type of bond and build program.

California: Another example of P3 innovation is SR-91, the first high occupancy toll lane/managed lane in California. HNTB was on the initial private-sector team, and I can tell you the concept was risky. We wondered, "Would people be willing to pay for use of a lane adjacent to a free lane?" Ultimately, the project was very successful and HOT lanes are now part of the federal program.

I believe a very important precedent on SR-91 was the setting of future toll rates. They were established based on a mathematical formula tied to the traffic demand for the facility. When the facility first opened a little more than 10 years ago, the maximum toll was about $2.50 and now it is $9.25, by far the highest rate per mile in the nation, but the public has accepted the concept. It is truly market based. The more people want to use the facility, the higher the toll rate. The pricing maintains maximum traffic flow and gets the most out of the system.

Texas: Texas has laid out its plans for Trans Texas Corridors of 4,000 miles of new roadways, costing up to $185 billion. Now the state is building it one step at a time with a combination of private concessions, public roadways and regional toll authorities. HNTB is working with the state to negotiate for the first segment, a $7 billion concession for a new Greenfield project - TTC Route 35. This concession contract will have a future revenue sharing component on a sliding scale, which is extremely important to protect the public's interest and guard against unreasonable super profits.

MARKET PRICING WITH PUBLIC-PRIVATE PARTNERSHIPS

In the future, market pricing to manage traffic flow will be commonplace, and we need to consider this in P3s and continue to be innovative. In many downtown urban areas such

as Seattle there are several major multi-billion dollar projects that may be built as a P3 tolled facility. In addition, there will be a system of managed lanes around the area that would work best if the public agency varied the pricing to manage the traffic flows. If the individual projects were built as traditional P3s, where the private sector financed the project and had the right to keep the toll revenue, conflicts would arise if the toll rate varied and traffic patterns shifted. But, if we built the facilities as P3s and reimbursed the private investor by availability payments and still tolled the facility, the state would keep the toll revenue. The state or public sector could vary toll rates and manage traffic and the private sector would get a fixed reasonable return.

PUBLIC-PRIVATE PARTNERSHIP LESSONS LEARNED

We need to learn from these experiences and continue to be flexible and innovative as we define transportation solutions. Some of the P3 lessons we have learned include:

- An overall vision of the entire transportation system is needed up front
- Careful assessment is needed to determine the best procurement method
- Tolling an existing facility needs to overcome public opposition. This opposition is based upon the public's belief that they are paying for an existing facility twice
- If existing facilities are tolled, the revenue must stay in transportation
- We should consider toll pricing based on traffic demand to manage the flow and get the most from our systems
- Future toll revenue sharing protects the public's interests and ensures that all revenue does not go to the private entity
- Consider mass transit components as well

CONCLUSION

Given funding shortages, states are finding their own solutions and seeking flexibility in how they contract so they can deliver projects. It is clear that there is no silver bullet that works best for every project. For some states, changing their project delivery methods through design-build has proved to be a way to move projects forward. For other states, P3s have provided the funds needed to upgrade facilities and in some cases created new, more technologically advanced ones. The fact remains – we need to find ways to increase our resources in order to maximize the way we deliver transportation projects now and in the future.

I hope this has given you insight into the changes we are undergoing and what challenges and opportunities lay ahead. We look forward to advancing transportation in the United States and are eager to help shape innovative methods for our transportation future.

P. 83
Line 1976

Design-Build Effectiveness Study – As Required by TEA-21 Section 1307(f)

Final Report

Prepared for:
USDOT - Federal Highway Administration

January 2006

AECOM CONSULT

Colorado

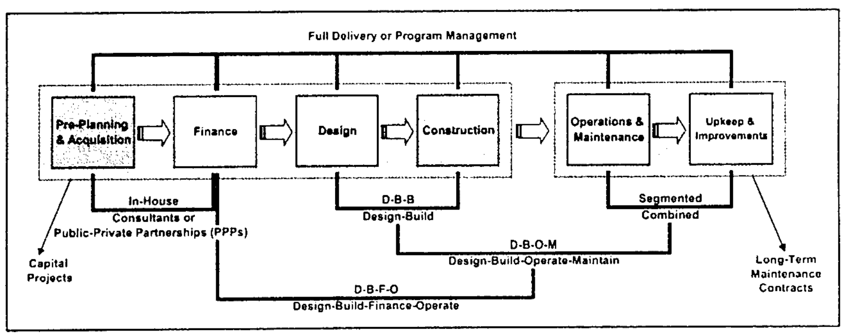
EXECUTIVE SUMMARY

BACKGROUND

Since 1990, a number of transportation agencies (as owners, sponsors, or contracting agencies of highway projects) have been experimenting with a wide variety of innovative project delivery strategies aimed at lowering the costs and time to produce highway construction and rehabilitation projects, while maintaining or improving project quality. One of these strategies is design-build (D-B) project delivery. Design-build is a method of project delivery in which the design and construction phases of a project are combined into one contract, usually awarded on either a low bid or best-value basis. This is in marked contrast to the more traditional design-bid-build (D-B-B) approach used in transportation agencies that outsource project design work, in which two different contracting efforts must be undertaken in sequence to procure architecture/engineering services on a negotiated-price basis and construction services on a lowest-responsible-bid price basis.

Exhibit 1 displays different types of project delivery approaches that combine various phases of the project life cycle. Many of these project delivery approaches extend far beyond the scope of design-build contracting by placing increasing functional responsibilities for highway infrastructure under a single contract vehicle.

Exhibit 1 Alternative Contractual Arrangements for Delivering Highway Infrastructure

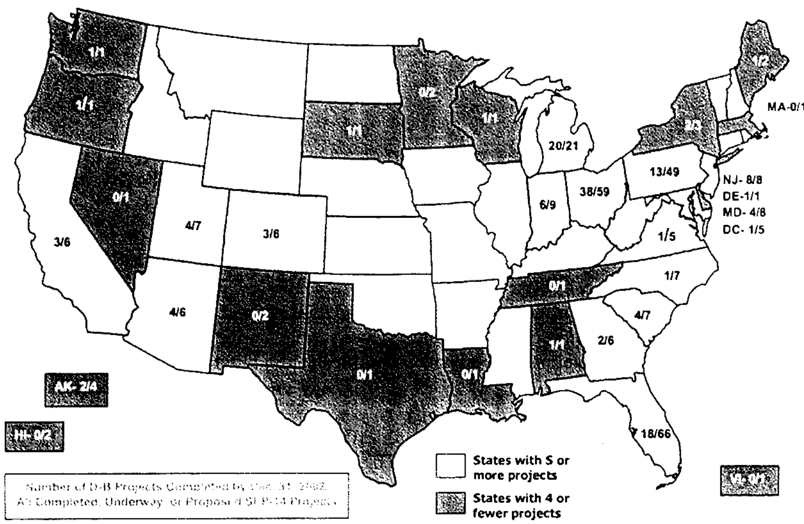


Source: Pakkala, Pekka. *Innovative Project Delivery Methods for Infrastructure—An International Perspective*. Finnish Road Enterprise, Helsinki, 2002, p. 32.

In 1990, Special Experimental Project Number 14 (SEP-14) – Innovative Contracting, was established by the Federal Highway Administration (FHWA) to enable state transportation agencies (STAs) to test and evaluate a variety of alternative project contracting methods that provided the potential to expedite highway projects in a more cost-effective manner, without jeopardizing product quality or contractor profitability. One of these methods was design-build, which remains a core element of SEP-14. Between 1990 and 2002, about 300 projects representing $14 billion were proposed for design-build contracting under SEP-14 by

transportation agencies in 32 states, the District of Columbia, and the Virgin Islands. Of this total, 140 projects representing $5.5 billion were completed by the end of 2002. Exhibit 2 shows the total number of design-build projects proposed, active, or completed by each of the states participating in the SEP-14 program.

Exhibit 2 SEP-14 Design-Build Projects by State (total and those completed by December 31, 2002 by STAs, toll agencies, or local public agencies)



Source: Design-Build Projects Approved Under SEP-14, Federal Highway Administration, July 2003

DESIGN-BUILD CONTRACTING FINAL RULE

In 1998, the Transportation Equity Act for the 21st Century (TEA-21) became the new authorization legislation for the nation's surface transportation programs. Included in TEA-21 was Section 1307 (c), which required FHWA to develop and issue regulations describing the Agency's approval criteria and procedures. The Design-Build Contracting: Final Rule was published in the Federal Register on December 10, 2002 and became effective on January 9, 2003.[1]

[1] Federal Register, December 10, 2002, Volume 67, No. 237, pages 75902 - 75935

The following lists the most salient parts of FHWA's Design-Build Contracting Final Rule for consideration by both representatives of transportation agencies and firms interested in proposing on prospective projects using the design-build contracting approach:

- Allows but does not require use of design-build contracting approaches;
- Permits the use of design-build contracting on both qualified and non-qualified projects, where qualified projects are those over $50 million (or $5 million for Intelligent Transportation Systems (ITS) projects);
- Requires completion of the NEPA environmental clearance process prior to the release of the final request for proposals document;
- Allows responsive unsuccessful proposers to receive stipends as partial compensation for their proposal development costs;
- Eliminates minimum percentage participation by prime contractors on design-build teams;
- Allocates various forms of risk based on ability to manage and control these risks;
- Encourages consideration of value engineering and life cycle costing;
- Permits multiple notices-to-proceed to enable work to proceed on specific project sections when environmental, utility, permit, and right-of-way clearances have been completed for those sections;
- Defines requirements for avoiding conflicts of interest in the procurement process;
- Allows for public-private partnerships to submit design-build contract proposals under a competitive process, consistent with state and local laws as well as applicable non-procurement requirements such as Buy America, Davis-Bacon minimum wage, and right-of-way acquisition requirements; and
- Suggests using a two-phase selection procedure, consisting of (1) shortlisting qualified teams based on responses (containing technical and qualifications-based information) to a request for qualifications (RFQ), and (2) evaluating technical and price proposals submitted in response to a request for proposal (RFP).

STUDY RATIONALE AND FOCUS

Section 1307 (f) of TEA-21 required that a comprehensive national study be conducted to evaluate the effectiveness of design-build contracting, with the results subsequently reported to Congress. The five objectives specified in Section 1307 (f) for this study included the following:

1. Assess the effect of design-build contracting on project quality, cost, and timeliness;
2. Recommend the appropriate level of design for design-build procurements;
3. Assess the impact of design-build contracting on small businesses;
4. Assess the subjectivity used in design-build contracting; and
5. Recommend actions and changes to design-build contracting procedures.

This study focuses on completed design-build projects authorized under SEP-14. This is the first comprehensive study of the SEP-14 Program involving both program and project managers who have been directly responsible for Federal-aid highway projects delivered under the design-build contracting approach. Its findings and conclusions are based on the results of an extensive literature search, interviews with key stakeholders involved in the Federal-aid highway program and SEP-14, and an integrated set of surveys of transportation agency personnel responsible for design-build programs and projects developed under SEP-14.

- The program-level surveys reveal how the state transportation agencies participating in the SEP-14 Program view the application of design-build contracting on their programs and projects.
- The project-level surveys indicate how design-build project delivery is used and its consequences for a broad sample of SEP-14 projects completed before the end of calendar year 2002.
- The project survey also collected information on a limited sample of similar projects that were delivered using the traditional design-bid-build contracting method. This provided the opportunity to assess on a limited case-study basis differences in project performance between design-build and design-bid-build project delivery, including cost, duration, quality, and other factors related to competition and fairness.

RESULTS OF PRIOR STUDIES

This is not the first study of performance issues resulting from the application of design-build contracting to infrastructure projects. In the past ten years, a number of domestic and international studies have sought to determine how innovations in project delivery affect projects built by the private sector, defense agencies, and public infrastructure agencies. The following summarizes the key findings and conclusions from these prior studies:

- Prior research into the impacts of design-build relative to design-bid-build includes comprehensive studies of building projects, both domestic and in the United Kingdom, and more limited studies of horizontal (highway) projects.
- Both types of projects (buildings and highways) typically show a significant advantage for design-build in lowering the duration of the project, with a broad range of 4 percent to 60 percent reduction relative to design-bid-build.
- Both types of projects typically show a cost advantage for design-build, but by counting the exceptions the range is from an 18-percent reduction to a 23-percent increase in cost.
- There is little quantitative data on the quality of design-build versus design-bid-build, although what exists indicates the two approaches produce similar quality results.

SUITABILITY OF DESIGN-BUILD PROJECT DELIVERY

Projects of many sizes and complexities have used design-build project delivery over the years since the inception of the SEP-14 Innovative Contracting program. However, the overwhelming majority of SEP-14 program costs have been for projects over $100 million in cost. This reflects the perceptions of design-build program managers surveyed for this study who rated the following project types as most suitable for design-build project delivery:

- Road widening or new construction
- Road rehabilitation or reconstruction
- Bridge and tunnel projects

Least suitable among the project types was road resurfacing. The suitability rating for design-build contracting was highly correlated to the size of the project, wherein the suitability rating more than doubled when going from small projects to mega projects (projects over $100 million).

IMPACTS OF DESIGN-BUILD ON PROJECT DURATION, COST, AND QUALITY

On average, the managers of design-build projects surveyed in the study estimated that design-build project delivery reduced the overall duration of their projects by 14 percent, reduced the total cost of the projects by 3 percent, and maintained the same level of quality as compared to design-bid-build project delivery, as shown in Exhibit 3.

Exhibit 3 Summary of Estimated Impacts of Using Design-Build on Project Duration, Cost, and Quality

Duration Dimension	Value	Cost Dimension	Value	Quality Dimension	Value
Responses	62	Responses	48	Responses	61
Average	**-14.1%**	**Average**	**-2.6%**	**Average**	**0.0%**
Median	-10.0%	Median	0.0%	Median	0.0%
Mode	-0.1%	Mode	0.0%	Mode	0.0%
Maximum	50.0%	Maximum	65.0%	Maximum	10.0%
Minimum	-63.0%	Minimum	-61.8%	Minimum	-10.0%
Standard Deviation	**24.4%**	**Standard Deviation**	**20.5%**	**Standard Deviation**	**2.1%**

Source: D-B project survey: Q18, 45-60 responses

Impacts on Project Duration

Actual data for the surveyed design-build projects indicated an average drop of 1 percent between planned and actual total project duration. A comparison between the survey results for a subset of design-build projects and similar design-bid-build projects showed a 9 percent difference in total project duration and a 13-percent difference in construction phase duration

between the two types of project delivery approaches, with the design-build projects having the shorter durations. Program survey respondents perceived that design-build projects take more time to set up and procure, but once awarded, require less time for the contracting agency to administer in comparison to similar design-bid-build projects.

The results of the program and project surveys, including both project manager estimates and actual project documentation, supported the claim that the design-build approach can reduce the overall duration of a project, in certain cases significantly. Despite wide variations in changes to project duration among the surveyed design-build and design-bid-build projects, particularly for the construction phase, the results revealed that longer than planned contract development and evaluation timeframes and potentially longer construction timeframes could be more than offset by certain features of the design-build process.

These features included the following:

- Eliminating the need for a second procurement cycle by combining contracting for design and construction contracts.
- Integrating these functions during the project development lifecycle, while design-bid-build keeps them contractually separate.
- Producing improved designs that are more constructible and require fewer design "fixes" through change and extra work orders.
- Allowing parallel processing of activities occurring on different portions of a project while design-bid-build keeps them sequential.

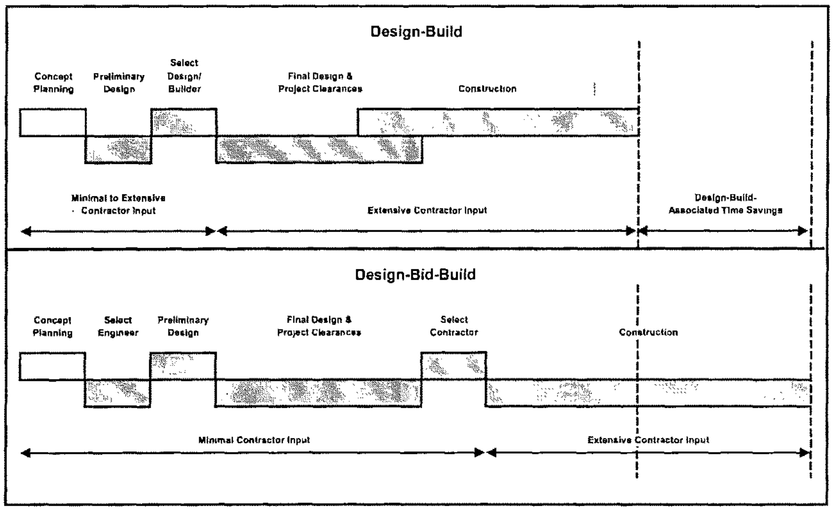
Exhibit 4 illustrates the general sequence of project development activities for both design-build and design-bid-build contracts. The two schedules demonstrate how the type of project delivery approach may influence the sequencing and duration of standard highway project development phases. The key feature that distinguishes these two project delivery approaches is the placement of design functions relative to the construction functions and the potential for overlap between the design and construction phases for the design-build approach.

Impacts on Project Cost

The project survey results revealed that design-build project delivery, in comparison to design-bid-build, had a mixed impact on project cost depending on the project type, complexity, and size. The surveyed design-build project managers indicated that project delivery approach (i.e., design-build versus design-bid-build) can be a contributing factor in controlling and potentially reducing project costs. However, project delivery approach was perceived to be less of a factor in affecting project cost than other characteristics of the project or its participants.

When project cost information was used from the project surveys, the design-build projects experienced no appreciable change in total cost due to off-setting cost increases and cost decreases among the project sample surveyed, which both vary widely. When cost information was used from a subset of similar design-build and design-bid-build projects, the design-bid-build projects demonstrated more favorable cost results.

Exhibit 4 Sequence of Project Delivery Activities by Contract Approach



Source: Dr. Keith Molenaar, University of Colorado at Boulder

Project costs experienced most growth from contract award to project completion. Respondents to the design-build project survey indicated that the leading cause of project cost changes was change orders: owner required additions or subtractions and design-builder or contractor suggested additions or subtractions. This was true for both project delivery approaches, with design-build projects being significantly more sensitive to delays, additions, or subtractions caused by third parties than design-bid-build projects.

Change orders represented 5 percent of the total costs for the surveyed projects. Claims represented less than one-tenth of one-percent of total project costs. The subset of design-build projects had fewer change orders than the comparable design-bid-build projects, but the average cost per change order was greater for the design-build projects. This can be attributed to the greater size of design-build projects. This was confirmed by the fact that change orders represented about the same share of total project costs for both design-build and design-bid-build projects. In contrast, the dollar value of claims per project was significantly lower for design-build projects than for comparable design-bid-build projects, with the subset of design-build projects having no reported cost of claims.

Impacts on Project Quality

Contracting agency satisfaction with the outcome and process of project delivery is one of the primary ways to measure the quality of different approaches. Project survey respondents expressed a high level of satisfaction with design-build projects, including compliance with

warranty provisions and conformance with standards and specifications. Based on a detailed statistical analysis of project survey responses, the research team discovered that overall contracting agency satisfaction was highly correlated with the following project characteristics:

- Procurement method;
- Type (complexity) of road project;
- Size of project; and
- Percent of preliminary design completed prior to contract award.

The results of this analysis are summarized in Exhibit 5.

Exhibit 5 Overall Contracting Agency Satisfaction by Project and Contract Type

Project/Contract Characteristic	Overall Sponsor Satisfaction	
	Lower	Higher
Procurement Method	Low Bid	Best Value
Project Type	Road-Resurface/Renewal	Road-New/Widen and Rehabilitate/Reconstruct
Project Size	Smaller	Larger
% of Design Completed at Award	Higher	Lower

Source: D-B project survey: Q2, Q4, Q10, and Q17; 69 responses

When a subset of 19 design-build projects was compared to similar design-bid-build projects, the survey results indicated that overall contracting agency satisfaction with design-build projects was on a par with design-bid-build projects. However, conformance with warranty provisions and standards and specifications were both rated higher for design-build projects than for similar design-bid-build projects.

OTHER DESIGN-BUILD CONTRACTING ISSUES

There are a number of additional issues relating to the use of design-build contracts that can impact the relative risk to the public and private sector participants in the contract and the opportunity to apply more cost-effective approaches to accomplishing the objectives of the project. These are discussed below.

Appropriate Level of Preliminary Design

Among the design-build projects surveyed for this study, design averaged 27 percent complete prior to design-build contract award. For 81 percent of the reported projects, the percentage of design completion by design-build contract award was 30 percent or less. For the subset of design-build projects surveyed, the average percent design completion prior to going to a design-

build contract was 37 percent, with 78 percent of the projects at 30 percent or less. An earlier survey of six STAs using design-build found a broad range for the level of preliminary design completed before issuing requests for bids of proposals for design-build projects.[2] The range was 15 percent to 50 percent, with the average among the six agencies being 31 percent.

These results are consistent with the finding in Exhibit 5 that the level of contracting agency satisfaction reported for design-build projects was higher for lower levels of preliminary design completed before design-build contract award. This can be attributed the design-builder's ability to influence the project design earlier in the process to promote its constructability and cost-effectiveness. While each project should be considered on an individual basis, the results suggest that no more than 30 percent of preliminary design be completed before design-build contract award, with lower percentages as the contracting agency gains more experience with design-build contracting and greater reliance is placed on performance-based specifications.

Impacts on Small Business

The advent of design-build project delivery has raised concerns by some that small firms[3] may be unable to participate on design-build teams, particularly as the design-build team lead or prime contractor, due to the increased functional scope and scale of many design-build contracts, more stringent qualification requirements, and/or higher bonding requirements. In some cases, contracting agencies have applied design-build to smaller projects to address these and other issues. In the context of this report, small business participation includes the involvement of smaller firms in design-build projects as a prime contractor, joint venture partner, or subcontractor.

Agency respondents to the design-build program survey indicate that the percentage of design-build project costs going to small businesses was about the same on average as for design-bid-build projects, with only a very small reduction indicated for design-build projects. These results suggest that small businesses were not disadvantaged when projects were developed through the design-build process, according to agency design-build program managers.

The survey results also indicated that design-build contracts spread more of the design work among subconsultants than comparable design-bid-build contracts, which should be a positive feature for small business enterprises.

Subjectivity in Contracting

The survey results suggested that while project urgency and innovation were the primary motivators for using design-build contracting, cost remained the primary factor for awarding

[2] Molenaar, Keith R. and Douglas D. Gransberg, *Design-Builder Selection for Small Highway Projects*, ASCE Journal of Management in Engineering, Vol. 17, No. 4, October 2001

[3] Small business is defined as any organization with less than 500 employees and $6 million in average annual receipts for service organizations ($28.5 million for general building and heavy construction contractors and $12 million for special trade construction contractors) For applicable small business size standards by industry category, see the U.S. Small Business Administration's Small Business Size Regulations, 13 CFR §121 or the Table of Small Business Size Standards.

design-build contracts, even when other factors such as duration, team reputation, and quality were included in the deliberations. In addition, low bid continued to play an important role in contract award decisions, with best-value approaches using multiple criteria including cost gaining momentum.

Since design-build includes a significant design element, it is important to include these other factors as is the case when purely design proposals are selected (which by law cannot be based solely on cost or low bid). Best value selection methods provide for the consideration of both cost and other, more subjective, factors such as project management, quality control, and team reputation. Best value is gaining popularity among contracting agencies of design-build projects due to its ability to consider all relevant factors that affect the desirability of a design-build bid.

AGENCY SUGGESTIONS FOR IMPROVING DESIGN-BUILD PROGRAMS

The project managers who completed design-build project surveys noted many lessons learned from these projects. Key lessons included

- Carefully choosing projects appropriate for design-build
- Adequately preparing to procure and manage a design-build project;
- Properly phasing the project by timing permitting, environmental clearance, and right-of-way acquisition prior to award of design-build contract;
- Leaving design guidelines "loose," with performance criteria designed to drive the creativity of the design-build team; and
- Maintaining communications between the contracting agency and design-build team.

They also identified various changes their agencies have undertaken or plan to make to improve the effectiveness of their design-build programs. Changes include amending quality assurance and quality control, better defining program guidelines, and working more closely with design and construction contractors to craft a better program. Several agencies also reported that their design-build programs were being reassessed on an on-going basis as projects moved through the process. Suggestions for further improving the design-build process included:

- More careful selection of projects appropriate for design-build;
- Better definition of the contracting agencies' and contractors' project scopes;
- Creation of more accurate bidding documents;
- Selection of design-build consortium on a best-value rather than low-bid basis;
- Modification of the quality control procedures; and
- Development of a procedure to review project design and manage construction issues.

CONCLUSIONS

Based upon the results of this study, the following conclusions are offered regarding the future disposition of design-build as an alternative method for delivering highway projects, relative to the areas of interest defined by Section 1307 (f) of TEA-21, which mandated this study:

Impacts on Project Timeliness

- The greatest motivation and realized benefit to a project contracting agency of using design-build instead of design-bid-build contracting is the ability to reduce the overall duration of the project development process by eliminating a second procurement process for the construction contract, reducing the potential for design errors and omissions, and allowing for more concurrent processing of design and constructing activities for different portions of the same project.

Impacts on Project Cost

- The impact of project delivery approach on project cost is more difficult to establish and the range of both cost increases and decreases was quite wide. Project costs are much more likely to be impacted by the following factors that are beyond the control of the design-builder:
  - Nature and complexity of the project;
  - Third-party requests for changes to the plans and the project; and
  - Quantity contingencies (typically +/- 10 percent) included in unit price-based design-bid-build contracts that apply to change orders and quantity overrun items but which are not present in lump sum-based design-build contracts.

  This last factor provides greater opportunity for a design-bid-build contractor to pass on added project costs before having to negotiate a new unit price contract.

- Greater cost efficiencies are most likely to occur for design-build projects as a result of enabling the design-builder to propose more cost-effective ways to realize the performance objectives of the project. This can be achieved by:
  - Encouraging the design-builder to use the latest innovative technologies and methodologies to more fully leverage available public resources;
  - Integrating the design and construction activities to reduce the potential for design errors and discontinuities between the design plans and construction efforts that can result in fewer change orders and extra work orders;
  - Shifting to greater use of performance-based specifications that promote design-builder creativity and decrease change orders; and
  - Greater opportunities to use value engineering in design-build than in design-bid-build.

- Significantly lower cost and number of claims for design-build projects reflect a fundamental shift in the adversarial nature of transportation construction contracting and bodes well for the future implementation of this procurement method, particularly for high visibility projects where cooperation between contracting agencies and their design and construction contractors is essential to project success.

Impacts on Project Quality

- Design-build does not appear to be a threat to the quality of highway projects. Indeed project contracting agencies expressed equal satisfaction with the results of design-build and design-bid-build projects, suggesting that the choice of project delivery approach is neither a determinant of nor a threat to project quality. Overall contracting agency satisfaction was highest when design-build was used for large projects, when lower levels of preliminary design were performed prior to the design-build contract, and when contract selection was based on best value.

Level of Design Completed Prior to Design-Build Contract

- The level of preliminary design that should be completed before a design-build contract is procured depends on the size and complexity of the project, the ability of the design-builder to develop a more cost-effective and constructible project design in a timely and competent manner, the degree to which performance specifications are used for the project, and the opportunity to gain valuable design capabilities, with earlier value engineering and constructability reviews as part of the process.

Impacts on Small Business

- Design-build projects provide opportunities for subcontractors to perform substantial portions of design-build projects. According to survey responses, small business contractors are playing comparable roles on completed design-build projects as for design-bid-build projects, with greater opportunities for subcontracting of the design work to smaller firms.

Subjectivity of Design-Build Contracting

- While low bid continues to be used as the basis for contract award decisions for many design-build projects, best-value approaches using multiple criteria including cost are gaining momentum. Best value selection provides for the consideration of both cost and other more subjective factors such project management, quality control, and team reputation and is gaining popularity among contracting agencies of design-build projects due to its ability to consider all relevant factors that affect the desirability of a design-build bid.

Other Considerations

- While the use of design-build is not a panacea for delivering highway projects, there are project features and circumstances that encourage its consideration if not use.
  - Medium to large projects that are more complex in nature and can benefit from the application of innovative concepts in project design and development earlier in the project conceptualization process are well suited to design-build project delivery.
  - New/widening, rehabilitation/reconstruction, and bridge/tunnel projects have the size and complexity to enable the private sector to apply more cost-effective ways to develop the project using design-build. These potential efficiencies permit design-builders to take on the higher project/contract risks associated with design-build contracting.
  - Projects that have a high sense of urgency (due to natural disasters or facility failures) or involve some kind of direct user fee-based financing are more likely to benefit from design-build contracting due to its ability to expedite project completion and/or facilitate the start of user fee-based revenue collection.
  - Projects with a dedicated revenue stream associated with completion (such as toll roads) provide added incentive for the public sector to complete a project on time and within budget.
  - Trained and capable contracting agency staff responsible for administering design-build projects must be designated for this method of project delivery, including procurement and contract administration processes.
  - The presence of a number of competent design and construction firms interested and willing to compete for work under the design-build contracting approach helps to ensure cost-competitive bids/proposals.
  - Public demands for accountability regarding project schedule and quality can be more readily met through the terms and conditions inherent in a design-build contract, where qualified design-builders take on more project risk associated with meeting the contract schedule and performance criteria because of their ability to apply innovative techniques that lower the costs of project delivery while achieving desired performance results.

- A large number of agencies have now undertaken one or more design-build projects under the auspices of SEP-14 and tested different ways to apply design-build to many different types and sizes of projects. The knowledge gained from setting up these programs and testing design-build provides a rich source of legislative, regulatory, procedural, and institutional documentation and insights to help institutionalize this process as an option for contracting agencies to consider as they develop their highway improvement programs and projects.

RECOMMENDATIONS

Based upon the results of this study, the following recommendations are offered to improve the use of design-build for delivering highway projects.

- The FHWA should continue to work with AASHTO and industry representatives to develop suggested guidelines and illustrative documents for use by contracting agencies interested in evaluating the design-build project delivery method. The FHWA recognizes this need and continues to support the activities of the AASHTO Design-Build Task Force and the design-build related research performed under the National Cooperative Highway Research Program (NCHRP). Two current research studies will be effective in accomplishing these goals: (NCHRP Project 25-25(12) - "Design-Build Environmental Compliance Process and Level of Detail Required" and NCHRP Project 20-07, Task 172, "Recommended AASHTO Design-Build Procurement Guide").

- To the extent practical, contracting agencies should provide for flexibility in the design criteria by using performance criteria to encourage creativity by the design-build proposing teams while providing a basis to hold the team accountable for project results.

- Preliminary designs that are incorporated in the RFP should be no more than 30 percent complete , dropping to lower levels as the size and complexity of the project increases and the contracting agency gains greater experience with this project delivery approach and the use of performance-based specifications.

- Raising the expertise and experience among transportation agency managers is a key challenge. Transportation agencies should invest in design-build training before attempting to execute their first design-build project. That training should include not only contracting agency personnel but also consulting engineers and construction contractors that will compete for these projects. On-going design-build training sessions could be used to institutionalize lessons learned for completed or active design-build projects.

- **CLOSING REMARKS**

The changing nature of the nation's highway development program and resources, at the federal, state, and local levels, is placing increasing burdens on the public sector's ability to meet the growing needs for renewed and expanded system capacity. Innovative techniques like design-build have been shown to offer the potential to help transportation agencies better serve these needs by doing things faster and more cost-effectively. While many of the conditions that spawned the promulgation of highly restrictive contracting laws and procedures early in the twentieth century are no longer in evidence, care must be taken to prevent a repeat of these conditions. This is why use of techniques like design-build contracting must be viewed and entered into with the understanding that the public and private participants in the process have a shared interest and liability for the process results, and are each held accountable for the results.

Design-build contracting represents a collaborative effort that integrates the various resources involved in the development of a highway project and provides incentives for a high level of technical performance and consistency with contractual budget and schedule terms. It has the potential to produce a more cost-effective project in less time than a process that contractually insulates the project participants while leaving the contracting agency with most of the project risk. The following quotes reflect the views of many of the respondents to the design-build surveys:

- *"We are sold on design-build. We feel that it offers the department an excellent option for procuring work faster and potentially more effectively that the traditional design-bid-build method." (a representative from the Construction Division , Utah Department of Transportation)*

- *"The design-build technique for transportation [project] delivery has provided the department with another tool to meet the needs of our customers, the traveling public. This technique allows us to move from concept to concrete at an accelerated pace which has helped us to meet the needs of local municipalities quickly. We could not have met the President's and Governor's economic stimulus initiatives had we not had the design-build option. This program has been extremely beneficial." (a representative from the Florida DOT)*

- *"We utilized the design-build contracting method to [respond] to a significant increase in the bridge construction budget with little time to implement [the project]. Design-build effectively brought the program to construction." (a project manager from the Michigan DOT)*

"This project would not have been possible without design-build project delivery." (a representative from the Alameda Corridor Transportation Authority)

TABLE OF CONTENTS

APPENDICES

I. INTRODUCTION

This introductory chapter presents an overview of the study effort, including study background, legislative basis for the study request, purpose and objectives, scope and methodologies, work plan, and research team.

BACKGROUND

During the 1980s and 1990s, State transportation agencies (STAs) across the nation attempted to bridge the gap between highway program resources and needs by seeking new funding sources and experimenting with alternative processes to expedite critical highway capital projects needed to support statewide mobility and economic development. Since 1990, a number of transportation agencies (as owners, sponsors or contracting agencies of highway projects) have been experimenting with a wide variety of innovative project delivery strategies aimed at lowering the costs and time to produce highway construction and rehabilitation projects, while maintaining or improving project quality. Such strategies include the leveraging of private sector strengths in design and construction engineering functions, delegation of responsibilities for materials testing and project inspection functions to contractors, streamlining the project development process, and applying innovative project delivery, procurement, and contract administration functions[1,2]. Among these strategies, design-build (D-B) project delivery represents one of the most promising yet controversial methods for streamlining the project development function and potentially lowering project cost and duration while maintaining or improving product quality.

Design-build is a method of project delivery in which the design and construction phases of a project are combined into one contract, usually awarded on either a low bid or best-value basis[3,4]. This is in marked contrast to the more traditional design-bid-build (D-B-B) approach applied by transportation agencies that outsource project design work, in which two different contracting efforts must be undertaken in sequence to procure architecture/engineering services on a negotiated-price basis and construction services on a lowest-responsible-bid price basis. In design-build, the engineering firm and construction contractor have the incentive to become an integrated team that works concurrently on the design and construction phases of different segments of a project, with the potential to expedite delivery and better control product quality and costs. Instead of separate procurement efforts for design and construction phases, design-build combines these two phases into a single procurement effort that may incorporate value-based award criteria—versus the traditional qualifications-based designer selection criteria and low bid-based contractor selection criteria.

[1] FHWA (2002) *Briefing-FHWA Initiatives to Encourage Quality Through Innovative Contracting Practices.* Special Experimental Projects No 14 (SEP-14).
[2] Transportation Research Board (1991). *Innovative Contracting Practices*, Transportation Research Circular 386, December
[3] Beard, Jeffrey L.; Loulakis, Michael C. Sr., Wundram, Edward C. (2001). *Design Build: Planning Through Development*, McGraw-Hill, New York.
[4] Friedlander, Mark C (1998). "Design/Build Solutions," *Journal of Management in Engineering*, ASCE, Nov/Dec, 59-64.

Design-build contracting has become a popular form of project delivery for private firms and public agencies responsible for the development of buildings and other types of vertical infrastructure, spurred by the need to expedite project delivery in times of economic expansion and military build-up. By the end of the last decade, design-build contracting had grown to almost one-quarter of the total dollar volume of non-residential construction in the US, according to the Design-Build Institute of America. Much of this activity has been for vertical infrastructure (buildings), with the private sector most heavily committed to this form of facilities development contracting. In the future, further growth is expected in the following areas of public sector construction: transportation, corrections, education, and water/wastewater facilities.

While design-build project delivery is not new to the building construction industry, it is relatively new to the highway construction industry, whose roots are largely in the post World War II era when design-bid-build was already the established way to procure and deliver many types of infrastructure projects. Interest in the design-build approach by contracting agencies of highway projects has been spurred by reported successes achieved in applying this approach to project delivery by other infrastructure development sectors in this country (for buildings) and overseas (for buildings and highways)[5,6,7].

In 1990, Special Experimental Project Number 14 (SEP-14) – Innovative Contracting, was established by the Federal Highway Administration (FHWA) to enable state transportation agencies to test and evaluate a variety of alternative project contracting methods that provided the potential to expedite highway projects in a more cost-effective manner, without jeopardizing product quality or contractor profitability. Between 1995 and 2002, about 300 projects amounting to $14 billion in costs were proposed for design-build contracting under the SEP-14 program by transportation agencies in 32 states, the District of Columbia, and the Virgin Islands[8]. This compares to only a handful that were proposed between 1990 and 1994. Exhibit I.1 shows the total number of design-build projects proposed, active, or completed in each state.

The results of projects undertaken in the early years of SEP-14 enabled FHWA to mainstream a number of innovative contracting approaches such as cost-and-time (A+B) based awards and the use of warranties in contracts to ensure product quality. However, the results of design-build projects proved inconclusive and controversial, with proponents and critics offering widely differing conclusions about the cost-effectiveness and equity of this alternative project delivery approach. As a result, A+B and lane rental contracting approaches became mainstreamed in 1995 while design-build contracting did not. Position papers by the major highway associations led FHWA to believe that the industry was not ready for wholesale deployment of design-build.

---

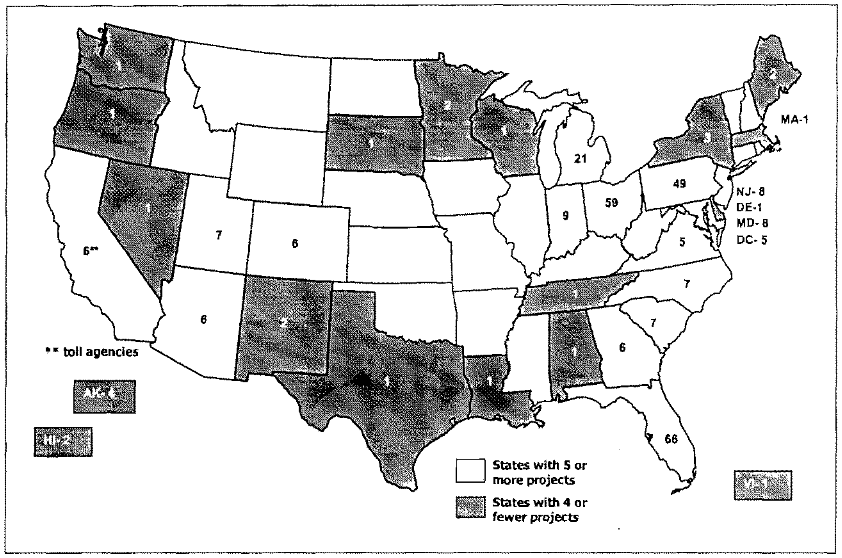
[5] Bennett, J.; Pothecary E.; Robinson, G. (1996) *The Industry Today: Designing and Building a World Class Industry*, Centre for Strategic Studies in Construction, United Kingdom.

[6] Pakkala, Pekka (2002) *Innovative Project Delivery Methods for Infrastructure: An International Perspective*, Finnish Road Enterprise

[7] Sanvido, V.; Konchar, M. (1999). *Selecting Project Delivery Systems, Comparing Design-Build, Design-Bid-Build, and Construction Management at Risk*, The Project Delivery Insitute, PA.

[8] FHWA (2002). *Design-Build Project Approvals under SEP-14 as of 12/31/2002*,

Exhibit I.1 SEP-14 Design-Build Projects by State
(proposed, active, or completed projects by STAs, toll agencies, or local public agencies)



Source: Design-Build Projects Approved Under SEP-14, Federal Highway Administration, July 2003

In 1998, the Transportation Equity Act for the 21st Century (TEA-21) became the new authorization legislation for the nation's surface transportation programs. Included in TEA-21 was Section 1307 (f), which required that a comprehensive national study be conducted to evaluate the effectiveness of design-build contracting, with the results subsequently reported to Congress. While individual transportation agencies have evaluated a number of design-build projects under SEP-14, there has not been a comprehensive national effort to evaluate these projects on a uniform basis. This study attempts to fill that void and respond to Section 1307 (f) by focusing the data collection and assessment on completed design-build projects authorized under SEP-14. SEP-14 projects provide the most comparable sample of completed design-build projects that are pertinent to the Federal-aid highway program.

PURPOSE AND OBJECTIVES

The purpose of this study is to report on the effectiveness of design-build contracting procedures in the Federal-aid highway program, as required by Section 1307 (f) of TEA-21. This section states:

> *(f) Report to Congress.--*
> *(1) In general.--Not later than 5 years after the date of enactment of this Act, the Secretary shall submit to Congress a report on the effectiveness of design-build contracting procedures.*

(2) Contents.--The report shall contain--

(A) an assessment of the effect of design-build contracting on project quality, project cost, and timeliness of project delivery;

(B) recommendations on the appropriate level of design for design-build procurements;

(C) an assessment of the impact of design-build contracting on small businesses;

(D) assessment of the subjectivity used in design- build contracting; and

(E) such recommendations concerning design-build contracting procedures as the Secretary determines to be appropriate.

SCOPE

To fulfill these study objectives, the analysis framework provides an objective basis for evaluating the impacts and implications of design-build contracting. The analysis framework defines the study scope and consists of the following attributes:

- The study focuses on capital projects in the Federal-aid highway program that were authorized under the SEP-14 Program and administered using design-build contracting by STAs, toll agencies, and local public agencies.
- Information was collected by web-based survey instruments regarding state design-build programs (as of the calendar year ending 2002), selected design-build projects performed under these programs, and comparable design-bid-build projects when provided by respondents.
- Only projects completed by the end of calendar year 2002 were considered for the fact-finding surveys to ensure that complete project performance histories could be obtained and to establish a consistent basis for assessing the performance of design-build contracting on Federal-aid projects.
- Design-bid-build, the more traditional form of project delivery used by state and local transportation agencies, served as the comparative basis for assessing the impacts of design-build project delivery.
- Additional information from prior or concurrent studies regarding the relative cost, schedule, and quality impacts of design-build versus design-bid-build project delivery was considered and included as comparative findings when applicable in terms of project types and delivery approaches considered.

Consistent with the study purpose and objectives, as defined by Congress, the following outcome criteria are used to evaluate the cost-effectiveness of design-build project delivery:

- Project cost
- Project timelines (duration)
- Project quality (contracting agency satisfaction)
- Level of preliminary design on which to base design-build contracts

- Subjectivity of award process for design-build contracts
- Small business impacts of design-build project delivery

These results were used to develop recommendations for improving the design-build procurement process and contract administration procedures.

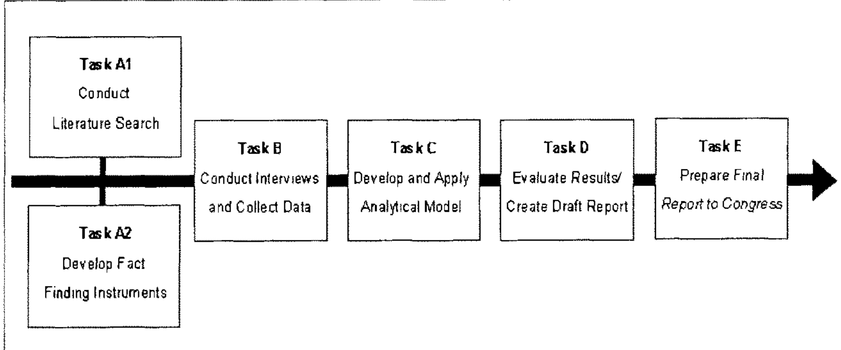
APPROACH

The findings and conclusions presented in this report are based on a variety of fact-finding and analysis approaches, including:

- Both domestic and international studies, papers, and articles by practitioners and researchers concerning alternative capital project delivery approaches and their implications and consequences, including design-build contracting (Appendix A contains a glossary of terms used in this report and Appendix G contains an extensive bibliography pertaining to design-build and other alternative contract delivery approaches);
- Prior surveys of highway capital programs and projects involving the application of design-build contracting and their impacts on project cost, duration, quality, and contracting agency satisfaction;
- Input provided by members of the study team, as well as the Intermodal Technical Advisory Panel and AASHTO's Design-Build Task Force;
- Lessons learned from the application of design-build contracting on other types of capital projects, including other modes, agencies, and industries;
- Summary information on highway capital projects in the SEP-14 Program, from its inception to October 2003 (Appendix C lists all completed, active, and proposed design-build projects in the SEP-14 Program at the time of the study fact-finding efforts);
- Baseline information on projects in the SEP-14 Program that were completed by the end of calendar year 2002 (Appendix F contains a summary and listing of completed SEP-14 projects for which evaluation reports were submitted by their contracting agencies);
- Comprehensive surveys of SEP-14 program managers at the state level (including STAs, toll agencies, and local public agencies), regarding the nature and effectiveness of their agency's design-build programs (Appendix B contains a detailed listing of the SEP-14 design-build program managers in each of the agencies contacted during the study and Appendix D describes the distribution of SEP-14 projects surveyed and reported);
- Comprehensive surveys of SEP-14 project managers regarding the nature and effects of design-build project delivery for a structured sample of completed projects as of the end of 2002, as well as comparable design-bid-build projects where available and submitted by the respondents (Appendix E contains the program, project, and comparable project survey instruments and instructions); and
- Comparative analysis of the responses to the program, project, and comparable project surveys to address the questions posed by Congress in Section 1307 (f) of TEA-21.

A five-task work plan, shown as Exhibit I.2, was followed to develop the data inputs, perform the analysis, and generate the findings and recommendations that are contained in this report.

Exhibit I.2 Study Work Plan



~~Source: AECOM Consult~~

A web-based interface was used to issue, receive, and process the surveys, with designated state participants accessing a secure website at the University of Colorado's School of Construction Engineering & Management to review, complete, and submit their survey responses. Having a secure study website enabled the research team to:

- Disseminate information about the study to a broad audience, while providing secure access only to those individuals designated to complete program and/or project surveys;
- Quickly disseminate the three surveys and cover letters to all designated state design-build program managers and to retrieve the results as soon as the surveys were completed by the respondents;
- Monitor the completion status of each state design-build program and project survey;
- Quickly process the large amount of data that the surveys generated and develop graphical representations of results relative to the study issues defined by Congress; and
- Provide study participants and others interested in the topic of innovative project delivery approaches access to an extensive literature database, including direct links to numerous documents on file and related web portals maintained by others.

DESIGN-BUILD PROGRAM AND PROJECT SURVEYS

This is the first comprehensive study of design-build contracting to involve both program and project managers of transportation agencies who are directly responsible for Federal-aid highway projects delivered under this approach. The key findings presented by this report are based primarily on responses to three types of surveys provided by design-build program and project

managers in agencies participating in the SEP-14 program. Data collection for the program/project analysis portion of the study spanned the six-month period from October 2003 through March 2004. This is the timeframe during which the survey instruments were issued to agencies expected to participate in the study, completed by designated design-build program and project managers, and returned for processing via the secure study website.

The following describes the three surveys and the numbers of each that were completed.

Design-Build Program Survey

The program-level survey determined how transportation agency managers participating in the SEP-14 Program view the use of design-build for their projects. For the purposes of this study, all agencies with active design-build programs were asked to complete program surveys, even if none of their projects were completed by the end of calendar year 2002 (the end date for project consideration). This included those transportation agencies, toll agencies, or local public agencies with design-build programs (toll agencies or local public agencies administered design-build projects in California, New York, and Tennessee)—for a total of 32 states plus the District of Columbia. Of this total, 27 states (including two local toll agencies) and the District of Columbia completed the design-build program survey, for an 85 percent response rate.

Design-Build Project Survey

The project-level survey was used to develop information on how design-build project delivery is used and its perceived consequences for a broad sample of SEP-14 projects completed before the end of calendar year 2002, as reported by agency managers responsible for these projects. A total of 282 projects made up the SEP-14 program for design-build projects by the end of 2002. Of this total, 140 projects had completion dates by the end of calendar year 2002. This group of completed design-build projects represented 24 out of the 32 states (plus the District of Columbia and the Virgin Islands) with design-build programs (71 percent of design-build states).

A sample of 86 projects out of 140 projects in the SEP-14 project database completed by the end of 2002 was selected for survey, representing 22 states and a broad cross-section of completed projects by type and size (a 61 percent sample). An upper limit of 12 projects per state was established to limit the amount of effort any one state would be expected to devote to this study's fact-finding process. Among the 22 states receiving design-build project surveys, 19 states submitted a total of 69 completed project surveys, representing an 80 percent response rate.

Given the modest number of design-build projects completed by the end of calendar year 2002, there is greater uncertainty in the results when the completed data sample is subdivided by state, project type, project size, or any number of disaggregating characteristic. Therefore, most of the survey results are presented in terms of the overall design-build program under SEP-14.

Comparable Design-Bid-Build Project Survey

In addition to completing surveys for designated design-build projects, respondents were asked to identify a comparable project using the design-bid-build project delivery approach for each design-build project surveyed, where a truly comparable project could be identified. The project-level survey was also used to develop information on these similar projects delivered by

the design-bid-build approach. This provided the opportunity to assess on a limited case-study basis differences in project performance between design-build and design-bid-build project delivery, including cost, duration, quality, and other factors related to competition and fairness.

This turned into a much more challenging effort than anticipated due to the difficulty in determining which projects could be considered comparable, identifying a knowledgeable person to complete the comparable project survey, and gaining the continued cooperation of respondents after completing the design-build program and project surveys. Consequently seven states submitted completed surveys for 17 design-bid-build projects. This represented 37 percent of the participating states and 25 percent of the design-build projects reported. Out of the 17 returned design-bid-build project surveys, 11 contained sufficient data to permit detailed analysis of project duration and cost by project phase. These results are reported in Chapter IV.

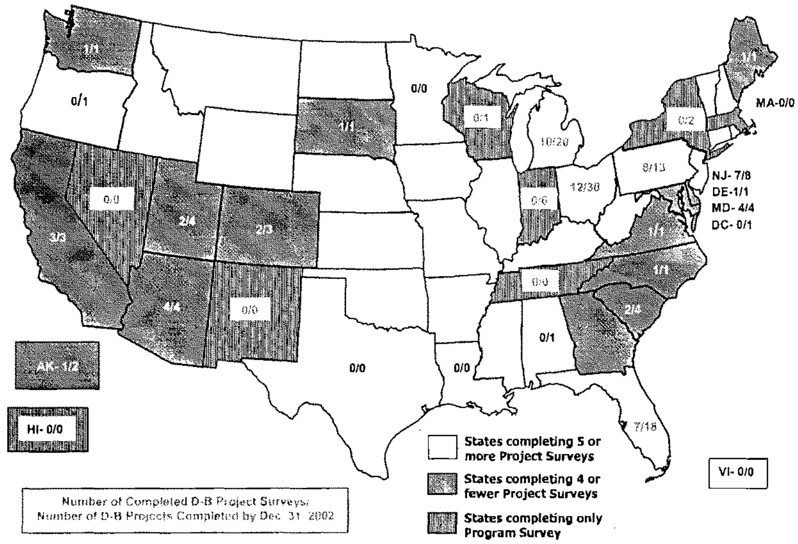
This is the first study to compare actual project results from similar pairs of projects, with one using design-build and the other using design-bid-build project delivery. Prior studies relied on comparisons based on actual results for design-build projects but only estimates of project cost and duration if delivered using the more traditional design-bid-build projects.

Survey Distribution and Response by States Participating in the SEP-14 Program

Exhibit I.3 shows the number of returned project surveys relative to the number of design-build projects completed by each state as of the end of calendar year 2002[9]. Appendix D provides a detailed discussion of the survey distribution and response rates relative to total number of state design-build programs and projects comprising the SEP-14 program at the time of the surveys.

[9] FHWA (2002). *Design-Build Project Approvals under SEP-14 as of 12/31/2002*, [illegible]

Exhibit I.3 Design-Build Program and Project Survey Responses by State



Source: Design-Build Projects Approved Under SEP-14, Federal Highway Administration, July 2003

ANALYSIS METHODOLOGIES

A number of analytical methodologies are used to develop study findings that address the issues raised by Section 1307 (f) of TEA-21. These include the following:

- Identify performance measures and comparison of performance results for alternative project delivery approaches based on prior research and case studies of design-build and other project delivery approaches relative to the traditional design-bid-build approach.
- Develop findings from responses to the design-build program and project surveys distributed during the study using various comparative analysis techniques as appropriate, such as:
  - Univariate analysis comparing selected performance measures such as cost growth, delivery speed, schedule growth, and quality measures;
  - Comparisons of central tendency measures such as means, medians, and deviations;
  - Multivariate analysis techniques such as regression analysis; and
  - Statistical analysis of performance comparisons, where appropriate, to determine the relative significance of the results and level of confidence regarding their interpretation.

The application of multivariate analysis and modeling techniques to the survey results is limited in their application to this study because of the small number of comparable design-bid-build surveys that were completed and returned by state design-build project managers. This occurred despite repeated attempts to gain greater response rates over an extended timeframe that significantly stretched out the fact-finding efforts. The direct comparison of design-build and design-bid-build results reported in this study is therefore based on a combination of statistically significant findings and empirical data based on a limited set of comparable projects. The study results and findings are contained in Chapter IV.

RESEARCH TEAM

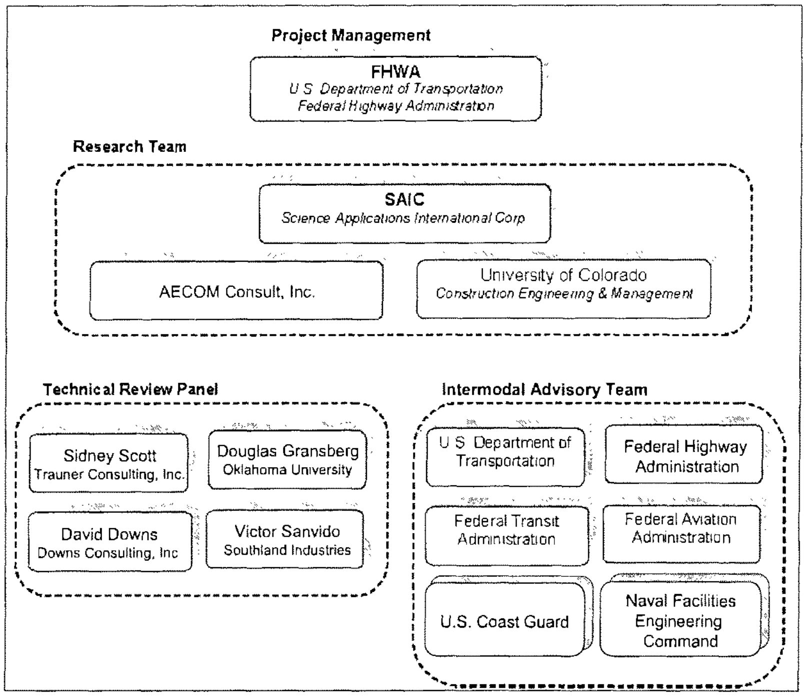
The research team for this study is shown in Exhibit I.8. Science Applications International Corporation (SAIC) served as the study contract manager. AECOM Consult, Inc. was the prime contractor, with Daniel Dornan serving as the Project Manager and Nathan Macek serving as the Principal Investigator. The University of Colorado's School of Construction Engineering & Management supported the team in the areas of literature search, survey development and processing, and survey results analysis. The University of Colorado team was led by Dr. Keith Molenaar, supported by graduate research assistants Jennifer Shane and Alfonso Bastias.

The team also included a Technical Review Panel composed of noted industry experts who provided review and comment on the survey design and analysis results, as noted in Exhibit I.8. These included the following:

- David Downs, P.E. – President, Downs Consulting, Inc.
- Dr. Douglas Gransberg, P.E. – Associate Professor, University of Oklahoma
- Dr. Victor Sanvido, P.E. – Vice President, Southland Industries, Inc.
- Sidney Scott III, P.E. – Vice President, Trauner Consulting Services, Inc.

An Intermodal Advisory Panel, representing both transportation modal administrations and defense agencies provided periodic review and comment on the interim deliverables of the study.

Exhibit I.4 Design-Build Study Research Team



REPORT OUTLINE

The remainder of this report consists of four chapters and seven appendices. The four chapters are briefly described below:

- **Chapter II – Design-Build Project Delivery**: discusses the background and characteristics of design-build project delivery relative to the more traditional design-bid-build approach. It also summarizes information developed in prior studies that have looked into the various consequences of alternative contracting approaches for developing infrastructure projects.
- **Chapter III – Special Experimental Program Number 14 – Design-Build Contracting**: discusses FHWA's experimental program, which has allowed the use of design-build for selected Federal-aid highway projects.
- **Chapter IV – Findings**: presents the findings of the various fact-finding efforts, particularly the design-build program and project surveys.

- **Chapter V - Conclusions and Recommendations**: provides a summary of the lessons learned as reported by the survey respondents and the changes already made and planned for the design-build programs of the surveyed agencies. The chapter also presents the conclusions and recommendations of the research team resulting from the overall study findings.

The seven appendices provide background documentation for the study, as listed below:

- **Appendix A – Glossary of Terms**
- **Appendix B – Participating SEP-14 Program States and Contact Information**
- **Appendix C – List of Total and Surveyed SEP-14 Projects**
- **Appendix D – Distribution of SEP-14 Projects Included in Study**
- **Appendix E – Survey Instruments and Related Documentation**
  - Email Cover Letter
  - Letter of Assistance
  - Survey Instructions
  - Survey Introduction
  - Program Survey
  - Project Survey
- **Appendix F – Summary of Completed SEP-14 Program Evaluation Reports**
- **Appendix G – Bibliography**

II. DESIGN-BUILD PROJECT DELIVERY

This chapter describes the nature of design-build as an alternative contracting approach to the traditional design-bid-build approach used by state transportation agencies to deliver projects funded through the Federal-aid highway program. It provides a historical context for considering design-build and other related project delivery approaches to the nation's highway construction program. It demonstrates the extensive use of design-build project delivery by other infrastructure development sectors, including buildings (vertical infrastructure) and public utilities (horizontal infrastructure). The section concludes by reviewing the results of prior studies of design-build and other innovative project delivery approaches and their performance relative to more traditional contracting approaches like design-bid-build.

DEFINITION OF DESIGN-BUILD PROJECT DELIVERY

There are a wide variety of ways in which infrastructure projects can be procured and delivered. Some segregate the roles and responsibilities of different phases of project development, as with design-bid-build in which the final design is completed by one party (in-house staff or under a negotiated contract) and subsequent construction is awarded to a separate low-bid contractor. Others integrate these activities under a single overall contract, as with design-build. Still others extend contract roles and responsibilities far beyond project development to include operations, maintenance, preservation, and even finance. Some are prescribed by federal and state statute and regulation (such as design-bid-build), while others are used extensively by private and certain public contracting agencies to expedite project delivery (such as design-build and its various manifestations)[1,2].

This report focuses on the design-build approach and its relative advantages and disadvantages to the more stratified design-bid-build approach. This and other related project delivery methods are defined below.

- **Design-Build (D-B)** - According to the Design-Build Institute of America (DBIA)[3], the design-build form of project delivery is a system of contracting whereby one entity performs both architectural/engineering and construction under one single contract. Under this arrangement, the design-builder warrants to the contracting agency that it will produce design documents that are complete and free from error (design-builder takes the risk). The selection process under design-build contracting can be in the form of a negotiated process involving one or more contracts, or a competitive process based on some combination of price, duration, and proposer qualifications. Portions of the overall design or construction work can be performed by the design-build entity or subcontracted out to other companies that may or may not be part of the design-build team.

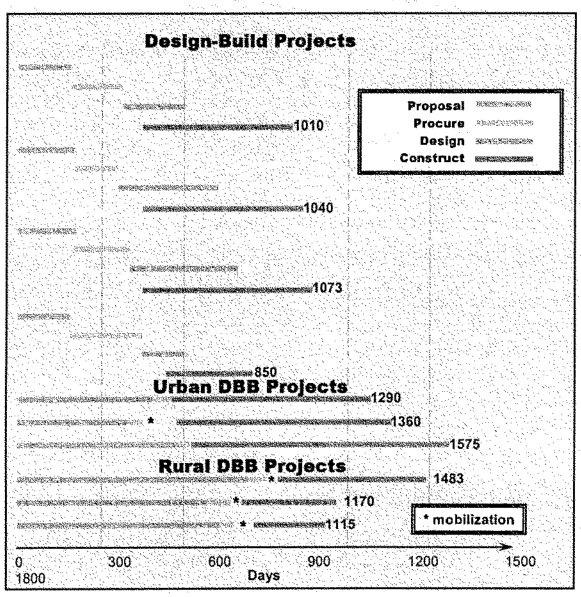
---

[1] Beard, Jeffrey L.; Loulakis, Michael C. Sr.; Wundram, Edward C. (2001). *Design Build: Planning Through Development*, McGraw-Hill, New York.
[2] Transportation Research Board (1991). *Innovative Contracting Practices*, Transportation Research Circular 386, December.
[3] *An Introduction to Design-Build*. Design-Build Institute of America, Washington, D.C., 1994.

- **Design-Bid-Build (D-B-B)** - Design-bid-build is another form of project delivery whereby the contracting agency either performs the design work in-house or negotiates with an engineering design firm to prepare drawings and specifications under a design services contract, and then separately contracts for at-risk construction by engaging a contractor through competitive bidding. Under this arrangement, the contracting agency warrants to the contractor that the drawings and specifications are complete and free from error (contracting agency takes the risk). The selection process for design-bid-build is usually based on negotiated terms for the design contract and lowest responsible bid for the construction contract.

Exhibit II.1 shows the actual project timelines for a number of comparable design-build and design-bid-build projects documented by the Arizona Department of Transportation in 2004.[4] Although the data for the design-bid-build projects omit the time to develop and procure design contracts for these projects, the design-build projects still have shorter delivery times, especially for urban projects. This chart illustrates the effect of concurrent sequencing of project development phases for design-build projects versus consecutive sequencing of these phases for design-bid-build projects.

Exhibit II.1 Project Timelines for Comparable D-B and D-B-B Projects



[4] Ernzen, Jim, Williams, Ron, and Brisk, Debra: Arizona Department of Transportation. *Design-Build vs. Design-Bid-Build: Comparing Cost and Schedule*. Excerpted from a presentation made at the 2004 Annual Meeting of the Transportation Research Board, Washington, D.C., January 2004.

Source: Arizona Department of Transportation

As noted in Exhibit II.2, design-build is one of several innovative project delivery, procurement, and contracting techniques that have potential application in the highway construction industry.

Exhibit II.2 - Innovative Procurement and Contracting Approaches

Project Delivery Approaches	Procurement Approaches	Contract Payment Approaches
• Indefinite Quantity/Indefinite Delivery • Construction Manager at Risk • Design-Build Contracts • Design-Build Warranty • Design-Build-Operate-Maintain (DBOM) • Design-Build-Operate-Maintain-Finance (DBOM-F) • Performance-Based Total Asset Management Contracts	• Alternative Bids/Designs • Request for Proposals • Cost Plus Time (A+B) • Multi-Parameter Bidding (A+B+Q) • Best Value	• Disincentive Provisions • Incentive Provisions • Incentive/Disincentive Contracts • Lane Rental Contracts • Active Management Payment Mechanism • No Excuse Bonus Contracts • Lump Sum Contracts

Sources: Gransberg, Douglas D.; Senadheeka, Sanjaya P. (1999). "Design-Build Contract Award Methods for Transportation Projects," *Journal of Transportation Engineering*, ASCE, 125(6), 565-567

State of Florida (1996). *Innovative and Alternative Contracting Practices*, Florida Department of Transportation, August 30, 1996

Transportation Research Board (1991). "Innovative Contracting Practices," *Transportation Research Circular 386*, December 1991

Design-build is an established process for developing major capital projects used by the private sector and the armed services, which may be less constrained by state or local regulations that limit opportunities for achieving its potential benefits. Within the highway construction industry, the design-build procurement and delivery mechanism is a relatively new concept that has not yet achieved widespread acceptance and application. This is because the design-build approach is perceived as:

- Changing the roles and relationships between project designer and construction contractor, which may impact the independence of the designer with regard to construction inspection and testing functions;
- Broadening the selection criteria to include more than just initial cost in selecting and awarding major construction contractors;

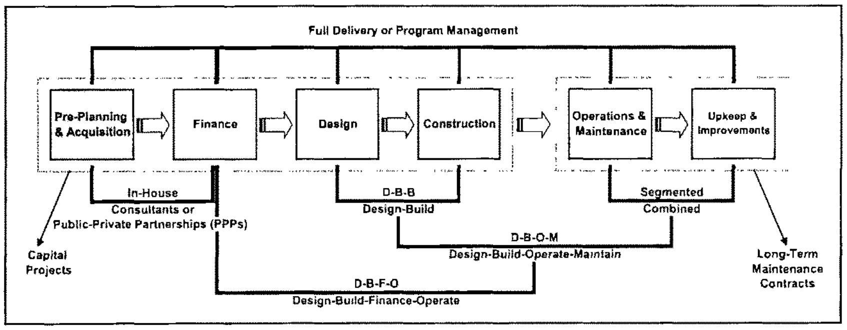
- Placing the emphasis on awarding the contract for both the design and construction phases of project development, thereby expediting the timeframe for committing available highway construction funds;
- Providing greater opportunity for larger construction and engineering firms to compete for projects, thereby potentially reducing project opportunities for smaller construction firms;
- Making it difficult to utilize unit price payments because a quantity survey cannot be completed before contract award; and
- Triggering legal or regulatory constraints of state and local governments that need to be relaxed or repealed before the approach can be more widely applied.

Other forms of design-build project delivery include the following variations and combinations:

- **Design-Build with a Warranty** (5, 10, 20 years) – the contractor provides an integrated design and construction process whose product is guaranteed to meet specified material and workmanship or performance standards over a prescribed timeframe. This usually applies to highway pavement. The inclusion of a warranty shifts more project risk to the design-build team and reduces the extent to which the contracting agency needs to conduct inspection and testing.
- **Design-Build-Operate-Maintain (DBOM)** – the contract team is responsible for design, construction, operation, and maintenance of the facility for a specified period of time, whereby payment beyond project completion is predicated on meeting certain prescribed performance standards relating to physical condition, capacity, congestion, and/or ride quality. This is an extension of design-build that provides an inherent incentive for the design-builder to provide a better quality plan and project by creating a lifecycle responsibility and accountability for the performance of the facility by the design-builder.
- **Design-Build-Finance-Operate (DBFO)** – this is an extension of the DBOM project delivery method in which the contract team is also responsible for the financing of the project and takes the risks of financing the project during the contract term.
- **Build-Operate-Transfer (BOT)** – this is a project delivery method similar to DBFO whereby the contract team acquires ownership of the facility until the end of the contract term at which time ownership of the facility is returned to the original public sectorcontracting agency.
- **Full Delivery or Program Management** – the construction entity provides a wide variety of services to the contracting agency beyond construction, starting at the planning stage and potentially continuing through facility operations and maintenance, thereby leveraging the resources of the contracting agency to a great extent.

Exhibit II.3 displays different types of project delivery approaches that combine various phases of the project life cycle.

Exhibit II.3 Alternative Contractual Arrangements for Delivering Highway Infrastructure



Source: Pekka Pakkala. *Innovative Project Delivery Methods for Infrastructure—An International Perspective.* Finnish Road Enterprise, Helsinki, 2002, p. 32.

Many of the project delivery approaches described above extend far beyond the scope of design-build contracting by placing increasing functional responsibilities for highway infrastructure under a single contract vehicle. The choice of which approach to use for a particular project depends on a number of factors, such as:

- Size and complexity of the project;
- Available budget for the project;
- Legal and regulatory ability to use various innovative project delivery techniques;
- Sources of funding for the project;
- Capability and creativity of the contracting agency; and
- Urgency of completing the project.

The effect of each contracting approach on project performance, as defined by several key performance measures, is discussed later in this section based on the results of several prior studies.

HISTORICAL PERSPECTIVE ON INFRASTRUCTURE PROJECT DELIVERY

According to Beard, et al.[5], the earliest form of infrastructure delivery involved a master builder serving as both project designer and builder. Throughout most of recorded history, this form of design-build project delivery has been used to develop infrastructure projects such as pyramids, temples, aqueducts, cathedrals, and major public buildings. The widespread use of design-build project delivery reflected the need to have the project designer intimately involved in the construction of the project to ensure the proper execution of the design plans and consideration

[5] Beard, J. L.; Loulakis, M.C.; Wundram, E. C. Design-Build: A Brief History. Design Build Planning Through Development. McGraw-Hill, 2001.

of construction challenges posed by the design before it is completed. In the absence of scientifically-based engineering principles, standards, and specifications, only the master builder had the experience and understanding of fundamental engineering and construction principles and techniques to know what could be built and how to build it. These master builders typically passed on their specialized skills and knowledge from one generation to the next, gradually enhancing the profession through the development and application of new techniques, often based on trial-and-error. By integrating these two sequential and highly interdependent phases of project development, the early design-builders could adjust the design to fit prevailing site conditions and to take advantage of new techniques or alternative sources of materials.

It was only in the period starting in Europe with the Renaissance that the knowledge and skills involved in project design and construction became increasingly complex, better documented, and more specialized. This enabled the design function to become more distinct from the construction function. Along with increased complexity and specialization came concerns over the accountability and responsibility of the various functions that comprise the project development process.

To respond to concerns over the objectivity and integrity of the project development process for large infrastructure projects in this country, particularly after such projects as the Transcontinental Railroad showed how favoritism and process manipulation could lead to fraud, waste, and abuse in the development of infrastructure, government agencies in the United States instituted contracting reforms late in the nineteenth century that culminated in the development of the two-step project delivery process known as design-bid-build.

Key legislative events in the United States that led to the formal separation of design and construction phases of infrastructure projects included the following:

- 1893 Congressional Act formally separating the design and construction phases of a capital project.
- 1926 Omnibus Public Buildings Act required all capital project plans and specifications be completed and approved before the construction phase can begin.
- 1947 Armed Services Procurement Act required that architectural and engineering (design) services be procured on a negotiated basis, while construction services continued to be procured through a formal advertisement and low bid selection process.
- 1949 federal procurement legislation extended the 1947 Armed Services Procurement Act requirements to all federal civilian agencies.
- 1972 Brooks Architect-Engineers Act required all design contracts for federal capital projects be awarded based on qualifications and not low bid.

Once it became institutionalized through laws and regulations, design-bid-build became the traditional form of procuring and delivering government infrastructure projects in the United States over the ensuing 50 years. This included Interstate highway facilities, whose genesis (starting with the National Defense Highway Act of 1956, which initiated the Interstate program of superhighway construction) postdated passage of most of the laws mandating design-bid-build for government projects.

Under the design-bid-build form of project delivery, the contracting agency first retains the services of an engineering design firm to prepare plans, specifications, and estimates (PS&E) for a project (unless the contracting agency uses in-house architects and engineers to do this). Once the PS&E is completed, the contracting agency then selects a contractor to construct the project. This two-step project delivery process separates the design and construction phases of project development, with the contracting agency assuming responsibility for the completeness and accuracy of the drawings and specifications produced by the design firm. As discussed further below, until 1996, federal law (the Brooks Act) precluded the award of engineering service contracts based on price, and required that they be awarded based on the qualifications of the winning team with the price determined through negotiation. Similar restrictions continue to be imposed on the award of engineering service contracts. Construction contracts are typically awarded on the basis of price, with the lowest responsible bid being awarded the contract (i.e., a realistic and responsive bid given the scope and complexity of the project).

RE-EMERGENCE OF DESIGN-BUILD PROJECT DELIVERY

As noted above, the development of the design-bid-build contracting process resulted from the increasing complexity and specialization of design and construction services, the perceived need to provide a check and balance between the development and execution of project plans, and a desire to produce projects at minimum cost. The primary benefits of design-bid-build were to reduce favoritism in the procurement process and spur competition among construction firms. However, as with most institutionalized processes, the benefits of design-bid-build began to be eroded by its inhibiting effects on the development and application of more efficient procedures and technology.

Despite the prevalence of the design-bid-build approach to project delivery among public works agencies, design-build project delivery has numerous advocates among private corporations not subject to federal procurement statutes and regulations, and certain public agencies responding to urgent requirements for project completion. Starting in the late 1960s, based in part on the successes achieved by the private sector in applying design-build to their capital projects and the need to expedite needed infrastructure projects and stretch scarce financial resources, a number of government agencies at the federal, state, and local levels began to experiment with and apply the design-build project delivery approach to reduce the time and cost to complete their projects. This included various branches of the Defense Department, public school districts, and public utilities, which became adept in its use for constructing buildings and other kinds of facilities (military base housing, schools, and water-wastewater treatment facilities). However it was not until the 1996 Federal Acquisitions Reform Act (Clinger-Cohen Act) that federal agencies received the legal authority to engage in design-build projects and use a new two-phase design-build process. Among the federal agencies using design-build project delivery are the Veterans Administration, General Services Administration, Postal Service, Federal Bureau of Prisons, Environmental Protection Agency, Department of Energy, and U.S. Army Corps of Engineers.

While design-build has become a significant project delivery approach for buildings, it is relatively new to the highway construction industry, whose roots are largely in the post World War II era in which design-bid-build was already the established way to procure and deliver all kinds of infrastructure projects. Interest in the design-build approach by sponsors of highway

projects has been spurred by the reported successes achieved in applying this approach to project delivery by other infrastructure development sectors in this country (for buildings) and overseas (for buildings and highways). As the nation's highway programs became increasingly challenged in the 1980s and 1990s, interest grew in alternative project development and delivery approaches that offered ways to improve the efficiency (time, cost, and quality) and cost-effectiveness of traditional contracting practices.

Responding to this renewed interest in alternative ways to deliver transportation infrastructure projects, the Transportation Research Board of the National Academy of Sciences established a broad-based task force of highway project delivery experts in January of 1988 to evaluate the potential for applying innovative contracting practices to Federal-aid projects, including design-build. This TRB task force (designated Task Force A2T51 – Innovative Contacting Practices) compiled information from a variety of domestic and foreign sources on contracting practices and their impacts on project cost, progress, and quality. The task force also considered impediments to the application of promising contracting approaches and made recommendations to improve contracting practices.

One of the outcomes of TRB Task Force on Innovative Contracting Practices was the establishment by the FHWA of an experimental project that would allow state transportation agencies to test and evaluate innovative contracting practices[6]. The development of Special Experimental Project Number 14 (SEP-14) – Innovative Contracting, provided the impetus for state transportation agencies, in cooperation with the FHWA, to try out these innovative approaches to project delivery; discover how they affect project costs, duration, and quality; and determine whether and under what conditions any of these contracting approaches might be used to improve the cost-effectiveness of Federal-aid highway projects. The SEP-14 Program and the lessons learned during the first ten years of testing innovative contracting approaches are discussed in the next chapter.

DESIGN-BUILD ISSUES

The rebirth of design-build as a project delivery method for government-sponsored infrastructure projects can be attributed to a number of complementary factors. First, design-build has its roots in the genesis of infrastructure development going back millennia when design and construction functions were integrated by the design-builder position. Second, in times of war or natural disaster the urgency to expedite projects has caused government agencies to suspend traditional procurement and contracting methods and permit alternative approaches such as design-build. Third, budget and personnel shortages or other constraints in the public sector and competitive pressures in the private sector have caused project sponsors to seek more cost-effective ways to deliver projects. Indeed, fiscal and national crises have often been the driving forces behind efforts to permit government to innovate and become more cost-effective. Design-build is viewed by many as one of the most promising "innovative" approaches to build highway infrastructure faster and cheaper without sacrificing product quality.

---

[6] Transportation Research Board (1991). "Innovative Contracting Practices," *Transportation Research Circular 386*, December.

Proclaimed Advantages of Design-Build Project Delivery

Proponents of design-build contracting proclaim a number of advantages over typical contracting arrangements such as design-bid-build[7,8,9], including:

- Time savings through:
  - Early contractor involvement that enables construction engineering considerations to be incorporated into the design phase and enhances the constructability of the engineered project plans;
  - Fast-tracking of the design and construct portions of the project, with overlapping (concurrency) of design and construction phases for different segments of the project; and
  - Elimination of a separate construction contractor bid phase following completion of the design phase.
- Cost savings from:
  - Communication efficiencies and integration between design, construction engineering, and construction team members throughout project schedule;
  - Reduced construction engineering and inspection (CEI) costs to the contracting agency when these quality control activities and risks are transferred to the design-builder;
  - Fewer change and extra work orders resulting from more complete field data and earlier identification and elimination of design errors or omissions that might otherwise show up during the construction phase;
  - Reduced potential for claims and litigation after project completion as issues are resolved by the members of the design-build team; and
  - Shortened project timeline that reduces the level of staff commitment by the design-build team and motorist inconvenience due to reduced lane closures.
- Improved quality through:
  - Greater focus on quality control and quality assurance through continuous involvement by design team throughout project development; and
  - Project innovations uniquely fashioned by project needs and contractor capabilities.

---

[7] Loulakis, M.C. (1999). *Construction Project Delivery Systems: Evaluating the Owners Alternatives*, AEC Training Technologies.
[8] Pakkala, Pekka (2002). *Innovative Project Delivery Methods for Infrastructure: An International Perspective*, Finnish Road Enterprise.
[9] Tenah, K.A. (2001). "Project Delivery Systems for Construction: An Overview," *Cost Engineering*, AACE International, Morgantown, WV, 43(1), 30-36.

In a design-build project development process, the procurement of the design-build contractor through a request for proposal (RFP) process might actually require substantially more time than the invitation for bid (IFB) process used to retain the construction contractor. However, overall time savings result from not having to go through two separate procurement processes, one for the design team and one for the construction team.

Proclaimed Disadvantages of Design-Build Project Delivery

Design-build contracting is also one of the most controversial of the innovative highway project delivery approaches, since it changes the fundamental way key stakeholders in the highway construction industry compete and cooperate with each other[10,11,12]. Critics claim that design-build:

- Reduces competition for construction services by excluding smaller firms unable to lead the larger projects most amenable to the design-build approach;
- Favors large national engineering and construction firms in competing for larger design-build contracts that are too big for smaller local or regional firms to pursue;
- Provides an opportunity for favoritism to enter into the contract award process by including non-price factors in the basis for selection;
- Undermines the inherent checks and balances between design and construction teams in the traditional delivery systems, with the design team no longer independent of the construction contractor;
- Strikes at the foundation of the traditional quality assurance/quality control roles through the combination of engineering and construction; and
- Increases project costs due to the elimination of the low bid contractor selection criteria.

In considering alternative project delivery approaches, proponents of more traditional approaches question whether adequate checks and balances are provided to ensure product quality, integrity in the procurement function, and fairness to established businesses that compete for these contracts. Others ask whether any one method of project delivery is preferred for all types of projects and situations, or if a portfolio of alternative approaches should be available to suit different situations and project types.

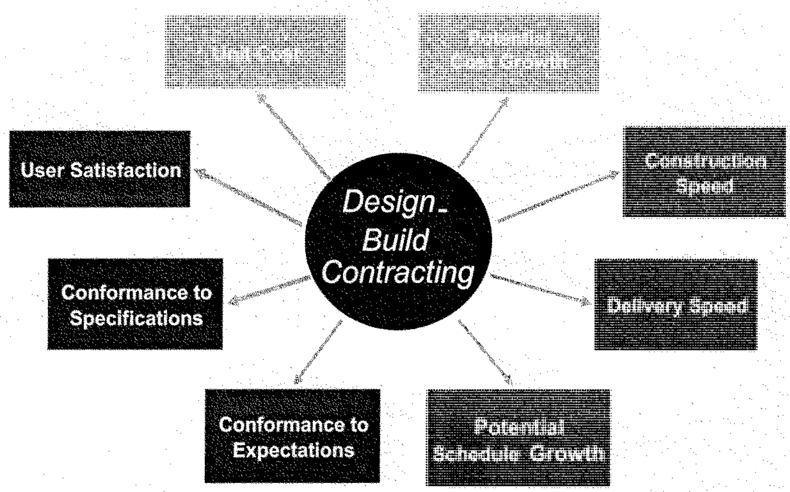
---

[10] Loulakis, M.C. (1999). *Construction Project Delivery Systems: Evaluating the Owners Alternatives*, AEC Training Technologies.
[11] Pakkala, Pekka (2002). *Innovative Project Delivery Methods for Infrastructure: An International Perspective*, Finnish Road Enterprise.
[12] Tenah, K.A. (2001). "Project Delivery Systems for Construction: An Overview," *Cost Engineering*, AACE International, Morgantown, WV, 43(1), 30-36.

EVALUATION CRITERIA FOR ASSESSING DESIGN-BUILD PROJECT DELIVERY

Past research has considered a number of performance criteria when analyzing the implications of design-build contracting,[13,14,15] as shown in Exhibit II.4. This study characterizes the implications of design-build project delivery versus the traditional design-bid-build project delivery in terms of selected project characteristics and relevant/measurable performance criteria that directly relate to the issues posed by Congress in framing the requirements for this study.

Exhibit II.4 General Criteria for Evaluating Design-Build Project Delivery



Source: AECOM Consult

Pertinent literature on design-build project delivery reveals that proponents and critics use similar criteria for judging the applicability and effectiveness of design-build and related approaches to project delivery. These criteria relate to performance objectives that proponents seek to achieve and performance standards that critics fear will be jeopardized by using design-build.

[13]Bennett, J.; Pothecary E.; Robinson, G. (1996). *The Industry Today: Designing and Building a World Class Industry*, Centre for Strategic Studies in Construction, United Kingdom.
[14] Gransberg, Douglas D.; Villarreal-Buitrago, Monica E. (2002). "Construction Project Performance Metrics," *AACE International Transactions*, AACE International, Morgantown, WV, CSC.02.
[15] Sanvido, V.; Konchar, M. (1999). *Selecting Project Delivery Systems, Comparing Design-Build, Design-Bid-Build, and Construction Management at Risk*, The Project Delivery Institute, PA.

Expanding on the general criteria shown in Exhibit II.4, this study used the following criteria to assess the advantages and disadvantages of using design-build versus design-bid-build:

- Duration of project development, comprising the following two phases:
  - From concept to contract award
  - From contract award to completion
- Total cost of project development, including the following:
  - Project planning
  - Project administration
  - Design
  - Construction
  - Quality assurance and quality control
- Quality of the completed facility, which can be measured in both quantitative and qualitative terms, including:
  - Owner satisfaction—meet or exceed expectation
  - Meet or exceed standards
  - User satisfaction
- Equity of the procurement process for prospective bidders including:
  - Individual firms or teams providing planning, architecture, design, construction, and inspection services
  - Large, medium, small, and disadvantaged firms
  - Domestic or international firms or teams
- Competition among prospective bidders in the highway design and construction industry including:
  - Individual firms or teams providing planning, architecture, design, construction, and inspection services
  - Large, medium, small, and disadvantaged firms
  - Domestic or international firms or teams

Among these factors, proponents generally agree that project duration or speed of delivery is the most significant factor motivating project sponsors to try design-build, particularly when an emergency or other urgent condition exists. Cost control is the next most frequently cited reason for using design-build, particularly for contracting agencies who wish to minimize the extent and impact of change orders on project costs. Quality is the one feature of a project that both proponents and critics agree must be preserved regardless of the applied delivery approach. Where warranties are included as a part of the contract, the emphasis on project quality takes on even more significance due to the added cost exposure of the project delivery team.

Equity and competition are both important issues in the design-build versus design-bid-build debate, prompted largely by a concern that innovative project delivery is merely a way to get around current regulations that protect the interests of and promote continued competition among competent project design and construction firms in the United States. A prevailing complaint is that innovative contracting approaches will change the competitive landscape for companies involved in a particular state's highway development program by placing local firms at a distinct disadvantage to larger national firms that have significantly more experience in successfully responding to these kinds of procurements in states with laws, regulations, and institutional context more favorable to alternative approaches. Another concern is that increased use of design-build will lead to fewer business opportunities for small businesses, including disadvantaged business enterprises, minority-owned firms, and female-owned firms.

Other performance indicators for judging the success of design-build contracting include:

- Integration of various functions that constitute the project development process by establishing singular responsibility for project design and construction;
- Transfer of project risks to the design-build team;
- Reduction in administrative burden following contract award; and
- Application of innovative techniques and products.

Each of these features can be measured by the five primary performance criteria listed above. Indeed, these five criteria reflect the specific areas of focus established by Congress in TEA-21 for this study, based on the results of the literature search, SEP-14 program and project surveys, and project databases available to the research team.

RESULTS OF PRIOR STUDIES

This is not the first study of performance issues resulting from the application of design-build contracting to infrastructure projects. However, this is the first study to focus specifically on these issues with respect to highway projects funded under the Federal-aid highway program, using completed SEP-14 projects as the primary source of information. In the past ten years, a number of domestic and international studies have sought to determine how innovations in project delivery affect projects built by the private sector, defense agencies, and public infrastructure agencies. Several of these studies focus on infrastructure projects built in countries where the institutional context is quite different from this country. With federal funding legislation granting state transportation agencies significant latitude to experiment with and apply alternative project delivery approaches on Federal-aid projects, an increasing body of literature has grown that reveals the consequences of these efforts on highway projects built in the United States.

The information and insights provided by these earlier studies is broader in scope and application than the results of the SEP-14 program and project surveys conducted in this study. These prior studies varied in a number of ways that limit their applicability to comparison with the results of this study. These include differences in the following dimensions:

- Geographic Locations
  - Europe
  - United States
- Types of Project Sponsorship
  - Private sector firms
  - Public utilities
  - Public transportation agencies
- Types of Projects
  - Buildings
  - Rail lines
  - Highways and bridges and tunnels
  - Production facilities
- Evaluation Criteria
  - Award, contract, and project growth
  - Contract and project delivery speeds
  - Customer satisfaction and degree of expectations met
- Types of Documentation
  - Project data
  - Anecdotal results
  - Perceptions and insights
- Project Delivery Approaches
  - Design-Build
  - Design-Bid-Build
  - Construction Management at Risk

Exhibit II.5 summarizes key information from these prior studies. The following summarizes the key findings and conclusions from these prior studies:

- Prior research into the impacts of design-build relative to design-bid-build includes comprehensive studies of building projects, both domestic and in the United Kingdom, and more limited studies of horizontal (highway) projects.
- Both types of projects (buildings and highways) typically show a significant advantage for design-build in lowering the duration of the project, with a broad range of 4- to 60-percent reduction.

- Both types of projects typically show a cost advantage for design-build, except the SR500 Thurston Way Interchange project with a 23-percent increase in cost relative to design-bid-build. Otherwise, the range would be a zero percent to 18-percent reduction.
- There is little quantitative data on the quality of design-build versus design-bid-build, although what exists indicates the two approaches produce similar quality results.

Exhibit II.5 Performance Results from Studies of Alternative Project Delivery Approaches

Vertical Infrastructure - Buildings	**Number of Projects or Agencies In Sample**	**% Reduction In Contract Cost Relative to D-B-B**	**% Reduction In Contract Duration Relative to D-B-B**
J Bennett, E Pothecary & G RFobinson, *Designing and Building a World-Class Industry*, University of Reading Design and Build Forum Report, Centre for Stratgegic Studies in Constrruction, Reading, United Kingdom, 1996	330	13%	30%
Victor Sanvido & Mark Konchar, *Selecting Project Delivery Systems Comparing Design-Bid-Build, Dseign-Build, and Construction Management at Risk*, The Project Delivery Institute, State College, PA , 1999	351	6%	33%
Design-Build 101 Basics of Integrated Service Delivery, Design-Build Institute of America/American Institute of Architects Professional Design-Build Conference, Chicago, Illinois, October 14, 1998	DOD	14%	18%
Design-Build 101 Basics of Intograted Service Delivery, DBIA	GSA	3%	N/A
Design-Build 101· Basics of Integrated Sorvice Delivory, DBIA	NAVFAC 1	12%	15%
Design-Build 101· Basics of Integrated Service Delivery, DBIA	Vet Admin	0%	28%
Linda N Allen, *Comparison of Design-Build to Design-Bid-Build as aq Project Delivery Method*, Master's thesis, Naval Postgraduate School, Monterey, CA , December 2001	NAVFAC 2	18%	60%
Horizontal Infrastructure - Highways	**Number of Projects or Agencies In Sample**	**% Reduction In Contract Cost Relative to D-B-B**	**% Reduction In Contract Duration Relative to D-B-B**
Illinois DOT Study by SAIC, 2002	11 states	3 of 11 states reported lower cost	10 of 11 states reported shorter duration
New York State DOT Design-Build Practice Report, 2002	9 agencies	5 of 9 agencies reported lower cost	9 of 9 agencies reported shorter duration
Arizona DOT Study Design-Build vs Design-Bid-Build - Comparing Cost and Schedule Jim Ernzen, Ron Williams, and Debra Brisk, TRB Paper 2004	13	4%	22%
Ralph Ellis, Zahar Herbsman, & Ashish Kumar, *Evaluation of the Florida Department of Transportation's Pilot Design/Build Program*, University of Florida, College of Engineering, Gainesville, FL , August 1991	11	11%	36%
Washington State DOT Study Design-Build Pilot Project Evaluation A Measurement of Performance for the Process, Cost, Time, and Quality - SR500 Thurston Way Interchange Dr Keith Molenaar, University of Colorado, Boulder, CO, January 2003	1	-23%	16%
Jim Emzen and Tom Feeney, *Contractor Led Quality Control and Quality Assurance Plus Design-Build Who is Watching the Quality?* Transportation Research Board Paper, 2000 Annual Meeting, Washington, D C , January 2000	1	N/A	30%
Bulk of Ambitious $1 6 Billion Design-Build Job Complete, Engineering News Record, May 14, 2001, Page 13 (Utah I-15 Design-Build Project)	1	0%	9%
ODOT Experience on Six Design-Build Projects, Ohio Department of Transportation, Columbus, OH , 1999	6	Lower administrative costs, little/no change orders or claims	Significant time savings

The use of design-build contracting goes beyond affecting project cost, delivery speed, and quality. Some states have used design-build to promote economic development. For example, in 2001 the Florida legislature passed a law that uses design-build project delivery as a key component of an economic stimulus package.

DESIGN-BUILD CONTRACTING FINAL RULE

In response to a requirement contained in Section 1307(c) of TEA-21, FHWA developed and issued a Final Rule laying out the regulations under which design-build contracting can be applied within the Federal-aid highway program. The Design-Build Contracting: Final Rule was published in the Federal Register on December 10, 2002 and became effective on January 9, 2003.[16]

The Design-Build Contracting Final Rule is based on the results of design-build projects developed and evaluated under SEP-14 since 1990 and significant comments provided by members of AASHTO and representatives of the various industries that make up the highway development community to a Notice of Proposed Rule Making (NPRM) published October 19, 2001.

The following lists the most salient parts of FHWA's Design-Build Contracting Final Rule for consideration by both representatives of transportation agencies and firms interested in proposing on prospective projects using the design-build contracting approach:

- Allows but does not require use of design-build contracting approaches;
- Permits the use of design-build contracting on both qualified and non-qualified projects, (where qualified projects are those over $50 million, or $5 million for Intelligent Transportation Systems (ITS) projects as defined by TEA-21, Section 1307(a));
- Requires completion of the NEPA environmental clearance process prior to the release of the final request for proposals document;
- Allows responsive unsuccessful proposers to receive stipends as partial compensation for their proposal development costs;
- Eliminates any minimum percentage participation by the prime contractor on the design-build team;
- Allocates various forms of risk based on ability to manage and control these risks;
- Encourages consideration of value engineering and life cycle costing;
- Permits multiple notices to proceed to enable work to proceed on specific project sections when environmental, utility, permit, and right-of-way clearances have been completed for those sections;
- Defines requirements for avoiding conflicts of interest in RFP development and proposal submission;

---

[16] Federal Register, December 10, 2002, Volume 67, No. 237, pages 75902 - 75935

- Allows public-private partnerships to submit design-build contract proposals under a competitive process, consistent with state and local laws; and
- Suggests a two-phase selection procedure, consisting of (1) shortlisting qualified teams based on responses (containing technical and qualifications-based information) to a request for qualifications (RFQ) and (2) evaluating technical and price proposals submitted in response to a request for proposal (RFP).

SECTION 1503 OF THE SAFE, ACCOUNTABLE, FLEXIBLE, EFFICIENT TRANSPORTATION EQUITY ACT: A LEGACY FOR USERS

Subsequent to the data collection efforts for this report, the President signed into law the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) on August 10, 2005. Section 1503 of this law includes several important provisions regarding design-build contracting. The following is a summary of the Section 1503 requirements:

- The definition of "qualified project" is broadened allowing a State transportation department or local transportation agency to award a design-build contract without the requirement to evaluate the project under the FHWA's experimental contracting program. This essentially removes the $50 million threshold for evaluating design-build projects under SEP-14.

- The Secretary is to issue revised design-build regulations that will provide for increased flexibility in initiating the design-build procurement process as it relates to the completion of the environmental review process. The regulations must not preclude a State transportation department or local transportation agency, prior to NEPA compliance, from:
    - issuing requests for proposals;
    - proceeding with awards of design-build contracts; or
    - issuing notices to proceed with preliminary design work under design-build contracts.

- The State or local transportation agency must receive concurrence from the Secretary before carrying out any of the preceding activities.

- The design-build contractor may not proceed with final design or construction prior to completion of the NEPA process.

*   *   *   *   *   *   *

Chapter III discusses how the FHWA has used the special experimental project (SEP) mechanism to enable transportation agencies to try alternative contracting approaches, including design-build, and to discover for themselves whether and under what conditions these innovative project delivery approaches produce sufficiently positive impacts on project cost-effectiveness to warrant more widespread use. The pilot projects approved under these testing and evaluation programs formed an important source of documentation for guiding development of the FHWA's Design-Build Contracting Final Rule, and for developing the results of this study contained in Chapter IV.

III. SPECIAL EXPERIMENTAL PROJECT NUMBER 14 – INNOVATIVE CONTRACTING

This chapter presents the program context for the assessment of design-build project delivery in the Federal-aid highway program. It describes the background and scope of Special Experimental Project Number 14 (SEP-14) – Innovative Contracting, under which state transportation agencies have been able to use design-build contracting approaches to deliver selected Federal-aid highway projects. It summarizes the composition of the SEP-14 program in terms of participating states; number, type, and size of design-build projects; and status of the program as of the end of calendar year 2002. This profile is representative of the SEP-14 program at the end of 2004 in that most of the projects currently in the program were proposed by the end of 2002.

SEP PROGRAM BACKGROUND

The nation's highway program is one of the largest infrastructure programs in the world. Based largely on revenues derived from federal and state taxes on motor fuels, the nation's highway program provides over $100 billion per year for construction, improvement, maintenance, and operation of interstate, state, and local roads. About three-quarters of this total come from federal and state user tax revenues. The remainder comes from local governments, tolls, general funds, and bond proceeds. Over half of the program funds are spent on capital improvement projects, 94 percent of which goes to Federal-aid highways. The remaining half goes to maintenance, operations, and administration of federal, state, and local roads, most of which (72 percent) is spent on state highways.[1] In the 2002 "Condition and Performance Report To Congress", the FHWA estimated additional highway program funding needs of $76 billion per year to maintain current conditions and $107 billion per year to bring the system up to appropriate standards[2].

In an effort to close the widening gap between highway program needs and resources, there have been a number of initiatives taken at the federal and state levels to increase program revenues and improve the cost-effectiveness of highway programs and projects. These initiatives include developing and applying alternative funding sources and financing methods, streamlining traditional project delivery processes and practices, and fostering broader partnerships among private and public stakeholders—all aimed at leveraging scarce public resources, including both funds and staff.

During the past fifteen years, with the costs of needed highway renewal, improvement, and expansion growing faster than available revenues and prospects pointing to further decline in the adequacy of traditional funding sources, a variety of federal acts have granted state and local transportation agencies increasing flexibility and freedom to apply new funding and financing approaches. These include:

---

[1] Highway Statistics, 2002 - Table SF-21, USDOT/FHWA, 2003.
[2] FHWA. (2002) *2002 Status of the Nation's Highways, Bridges, and Transit: Conditions & Performance Report to Congress.* http://www.fhwa.dot.gov/policy/2002cpr/index.htm.

- More flexible ways to provide matching funds for federal-aid projects - e.g., toll credits - counting capital expenditures on toll roads in a state towards the state/local match on Highway Trust Fund moneys (Intermodal Surface Transportation Efficiency Act of 1991 - ISTEA).
- Establishment of state infrastructure banks (SIBs) to provide a mechanism for administering the use of federal, state, and/or local transportation funds through credit assistance and revolving loans (National Highway System Designation Act of 1995 – NHS Act, Transportation Equity Act for the 21st Century – TEA-21).
- Provision of credit support and flexible terms for projects that involve third-party financing, and encouragement of public-private partnerships to leverage public funds for highway projects (Transportation Infrastructure Finance and Innovation Act of 1998 - TIFIA).
- Use of grant anticipation revenue vehicles (bonds or notes called GARVEEs) to expedite larger projects through the advanced accumulation of future federal funds (1995 NHS Act).
- Increased incentives for the use of public-private partnerships through improvements to innovative finance programs and the use private activity bonds for infrastructure improvements (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users - SAFETEA–LU).

SEP PROGRAM DESCRIPTIONS

Since 1990, the FHWA has used a "test and experiment" process to encourage contracting agencies to try innovative approaches to project development and delivery as a way to expedite delivery of needed projects. Two examples of this are:

- Special Experimental Project Number 14 (SEP-14) - which encourages the testing of innovative contracting approaches to assess their effects on project costs, duration, and quality.
- Special Experimental Project Number 15 (SEP-15) - which encourages innovation in a number of areas to foster public-private partnerships (PPPs), private investment, and more efficient project development processes and practices, in the areas of contracting, finance, planning, environmental clearance, and right-of-way acquisition.

Special Experimental Project programs permit the application of alternative approaches to develop and deliver selected projects on an experimental basis. The SEP process enables both federal and state transportation agencies to test and then evaluate new and promising techniques that would otherwise be prohibited under current statutes and regulations at the federal level. Project tests determine the advantages, disadvantages, applicability, and criteria for success for the alternative approaches being applied. Based on these documented results and the enthusiasm shown by contracting agencies and stakeholders, federal and state agencies can determine whether to mainstream certain alternative approaches that are found to be effective and appropriate, and the criteria for determining projects applicability.

FHWA first established SEP-14 in 1990 specifically for the purpose of for testing and evaluating on an experimental basis innovative contracting practices that offer the potential to reduce the life cycle costs of projects while preserving product quality and reasonable contractor profitability. Entitled the Innovative Contracting Practices, SEP-14 identified a number of innovative contracting approaches for trial, including cost-plus-time bidding, lane rental, design-build contracting, and warranty clauses. Other innovative contracting concepts tested under SEP-14 include indefinite delivery/indefinite quantity (IDIQ) contracts, alternative pavement type bidding, no excuse bonuses, lump sum bidding, price/qualifications bidding, quality incentives, warrantees and guarantees, system integrator contracts, and performance-based specifications.

After five years of trial and evaluation, FHWA mainstreamed the cost-plus-time bidding approach and allowed warranty clauses in contracts for items under the control of the contractor. However, due to continuing concerns over the cost-effectiveness and fairness of design-build contracting, design-build was retained under SEP-14 in 1995 to allow for additional testing and evaluation by interested state and local transportation agencies. To date, approximately two-thirds of the states and a few metropolitan areas have participated in SEP-14, with about half of the states completing at least one design-build project under SEP-14 by the end of 2002.

FHWA established SEP-15 in October 2004 to expand the number of functions for which alternative approaches can be tested to expedite projects and leverage scarce public resources through expanded opportunities for public-private partnerships. In addition to contracting, SEP-15 permits the testing of innovative approaches to finance, planning, environmental clearance, and right-of-way acquisition for designated projects. This new SEP-15 program expands on SEP-14 by enabling state and local highway agencies to test a combination of innovative approaches to different aspects of a project to optimize the effects on project cost, duration, and quality.

The common element in SEP-14 and SEP-15 is the ability to apply alternative contracting approaches to deliver highway projects. Design-build is unique among the methods evaluated under SEP-14 since it may encompass both SEP-14 and SEP-15 objectives, particularly if participant financing is part of the approach. Franchise and concession agreements are included in the term if the agreement provides for the franchisee or concessionaire to develop the project using the design-build approach.

SEP-14 DESIGN-BUILD PROGRAM OVERVIEW

Since the focus of this study is on evaluating design-build contracting as it relates to the Federal -aid highway program, the SEP-14 design-build program was selected as the primary basis for developing information on design-build programs and projects administered by transportation agencies. SEP-14 provides a common framework for addressing the issues and concerns raised by Congress in Section 1307 (f) of TEA-21. These include:

- Evaluating the cost-effectiveness and performance of design-build programs and projects;
- Determining the most appropriate types of projects for design-build project delivery;

- Developing conditions needed to protect the interests of both the contracting agency and contracting industry; and
- Developing strategies for improving the application of design-build and other related project delivery approaches to Federal-aid highway projects.

The following pages provide an overview of the SEP-14 design-build programs and projects that have been proposed or completed through the end of calendar year 2002[3]. This information reveals the extent to which transportation agencies have availed themselves of the opportunity to apply design-build contracting and indicates the types and size of projects that make up the program. It also indicates which states have been the most active in using SEP-14 to execute design-build projects and which types of projects various states have designated for design-build contracting.

Since its inception, STAs, toll agencies, and local public agencies in 32 states, the District of Columbia, and the U.S. Virgin Islands have established design-build programs under SEP-14. The latest summary of SEP-14 project information indicates there are 302 design-build projects in various stages of development, including proposed, active, and completed. Of these, there are 282 projects that have cost estimates or completion costs assigned to them.

Distribution of SEP-14 Projects by Type and Size

A wide variety of project types and sizes are included in SEP-14. For reporting purposes, SEP-14 results are grouped into the following project type and size categories:

- Project Types
  - Roads and Highways
    - New alignment and widening
    - Rehabilitation and reconstruction
    - Resurfacing
  - Bridges
  - Tunnels
  - Intelligent Transportation Systems (ITS)
  - Other (ferry boats, rest areas, sound walls, tower lighting, etc.)
- Project Sizes
  - Less than \$2 million (micro)
  - \$2 million to 10 million (small)
  - \$10 million to \$50 million (medium)
  - \$50 million to \$100 million (large)

[3] FHWA (2002b). *Design-Build Project Approvals under SEP-14 as of 12/31/2002*, http://www.fhwa.dot.gov/programadmin/contracts/sep14a.htm.

- Over $100 million (mega)

Given the limited number of tunnel projects in SEP-14 and their significance in terms of project size, bridges and tunnels are combined into the same category for reporting purposes in this report.

Exhibit III.1 provides summary statistics describing the breakdown of the SEP-14 design-build program projects by type and size.

Exhibit III.1 Distribution of SEP-14 Design-Build Projects (cost in millions)

Total SEP-14 Design-Build Projects - Proposed, Active, and Completed					
Project Type	**Number**	**%**	**Cost ($M)**	**%**	**$M/Project**
Road - New/Widen	78	28%	$9,390.5	67%	$120 4
Road - Rehabilitate/Reconstruct	35	12%	$2,447 8	18%	$69 9
Road - Resurface/Renewal	17	6%	$105.1	1%	$6 2
Bridge/Tunnel	105	37%	$1,432 4	10%	$13.6
ITS	12	4%	$74 0	1%	$6.2
Other	35	12%	$501 7	4%	$14 3
Total	**282**	**100%**	**$13,951.6**	**100%**	**$49.5**
Project Size	**Number**	**%**	**Cost ($M)**	**%**	**$M/Project**
<$2 Million	76	27%	$72 7	1%	$1 0
$2-10 Million	97	34%	$479.6	3%	$4.9
$10-50 Million	65	23%	$1,472.9	11%	$22.7
$50-100 Million	25	9%	$1,683 8	12%	$67 4
>$100 Million	19	7%	$10,242 6	73%	$539.1
N/A	0	0%	$0 0	0%	$0.0
Total	**282**	**100%**	**$13,951.6**	**100%**	**$49.5**

Source: Design-Build Projects Approved Under SEP-14, Federal Highway Administration, July 2003

The key characteristics of the SEP-14 program, as revealed by the figures in Exhibit III.1, are summarized below:

- The most prevalent SEP-14 design-build projects by type are Bridge/Tunnel and Road-New/Widen projects at 37 percent and 28 percent, respectively. Road-Rehabilitate/Reconstruct comes in third at 12 percent.

- Most of the funding for design-build projects is for Roads-New/Widen and Roads-Rehabilitate/ Reconstruct at 67 percent and 18 percent, respectively. Bridge/Tunnel comes in third at 10 percent. These three types of projects represent the vast majority of design-build projects in terms of numbers and costs.
- The numerical distribution of SEP-14 projects by size reveals the most prevalent projects are under $50 million, representing 84 percent of the total projects on the SEP-14 list.
- Most of the funding for design-build projects is for projects exceeding $100 million, representing 73 percent of total SEP-14 design-build projects. This reflects the influence of project size and the tendency of many contracting agencies to use design-build for very large projects that are more difficult and complex to administer. In contrast, the large percentage of projects under $2 million and the small percentage of money associated with these projects (1 percent) reveal the extensive use of design-build for small projects. This is particularly evident in those states that used SEP-14 to advance relatively small bridge replacement and rehabilitation projects in the program's early years.

Appendix D includes four additional tables that provide the same breakdown of information by project type and size for subsets of the data reflected in Exhibit III.1. This includes tables for each of the following sample sets of projects:

- The group of SEP-14 design-build projects completed by the end of calendar year 2002;
- Those SEP-14 design-build projects surveyed for this study;
- The surveyed SEP-14 design-build projects that produced a completed survey; and
- Comparable design-bid-build projects that had completed surveys.

Distribution of SEP-14 Projects by State and Timeframe

Exhibit III.2 shows the 32 states (plus the District of Columbia and the U. S. Virgin Islands) with design-build programs under SEP-14. Many of these states required special state legislation to use alternative procurement and contracting approaches for the delivery of highway projects. Also indicated is the number of design-build projects included in each state's program and how many of these were completed by the end of calendar year 2002.

As shown in Exhibit III.2, the states participating in SEP-14 are spread across the nation, with the most active states located in the east and southwest. Many of the Great Plains states have not yet participated in SEP-14.

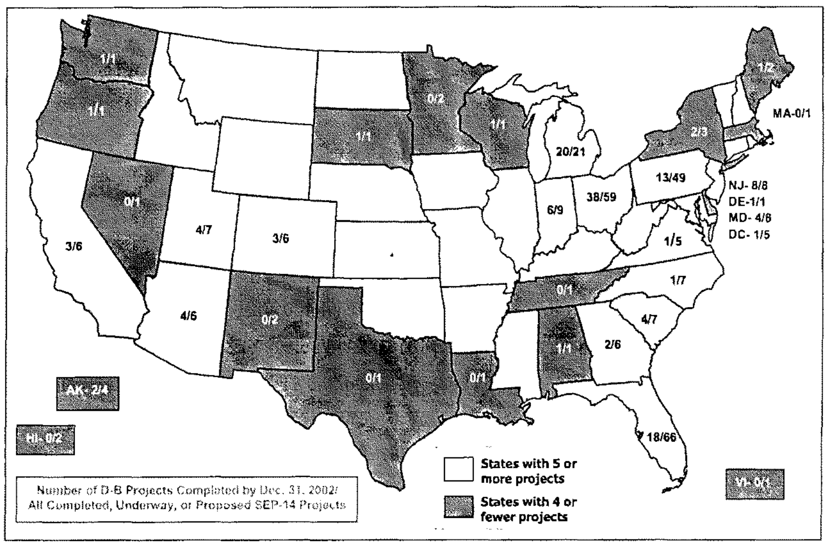
Major SEP-14 Design-Build Program States

Among the 32 participating STAs, toll agencies, or local transportation agencies, four stand out with the largest number and dollar volume of design-build projects authorized under the SEP-14 Program. These four states include the following (showing the proportion of each state's overall design-build program completed by 2002 to the program proposed by 2002):

- **Florida**: 66 projects – 18 completed by 2002 (10 percent of its proposed program value)

- **Michigan**: 21 projects – 20 completed by 2002 (98 percent of its proposed program value)
- **Ohio**: 59 projects – 38 completed by 2002 (61 percent of its proposed program value)
- **Pennsylvania**: 49 projects – 13 completed by 2002 (39 percent of its proposed program value)

Exhibit III.2 State SEP-14 Design-Build Programs and Projects
(total and those completed by December 31, 2002 by STAs, toll agencies, or local public agencies)



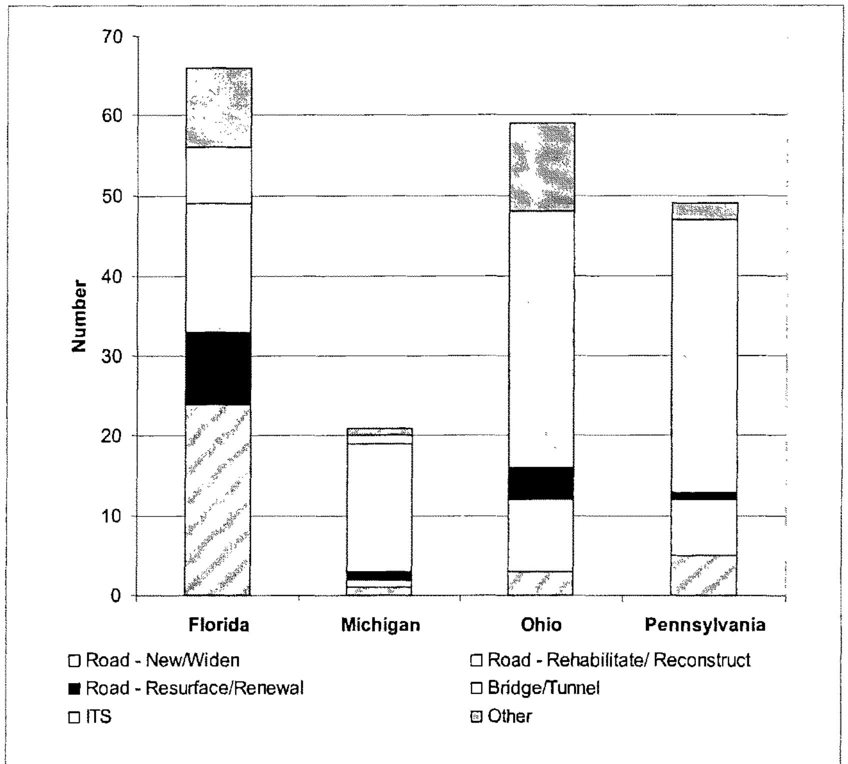
Source: Design-Build Projects Approved Under SEP-14, Federal Highway Administration, July 2003

These four states constitute 65 percent of the total number of design-build projects in the SEP-14 program and 12 percent of the total value of these projects. Among the SEP-14 design-build projects completed by the end of 2002, these four states comprise 64 percent of the projects and 9 percent of the total value. Both Michigan and Ohio represent early participants in the program since more than half of their projects were completed by the end of 2002. Michigan completed 95 percent of its proposed projects and Ohio completed 63 percent of its proposed projects by 2002. Both Florida and Pennsylvania show growing involvement in the SEP-14 Program, with most of their proposed projects coming after 2002 (73 percent for Florida and 71 percent for Pennsylvania).

Exhibit III.3 displays the relative number of design-build projects in each of the four major states. Florida has the largest number of projects and is the most balanced in terms of project type. The largest number of projects is in the Roads-New/Widen category, followed by

Bridge/Tunnel. The lack of Road-Rehabilitation/Reconstruct projects reflects Florida's decision to develop these types of projects using the more traditional approach. The other three states have a majority of their projects in the Bridge/Tunnel category. Both Pennsylvania and Ohio have more Road-Rehabilitation/Reconstruct projects than Road-New/Widen projects.

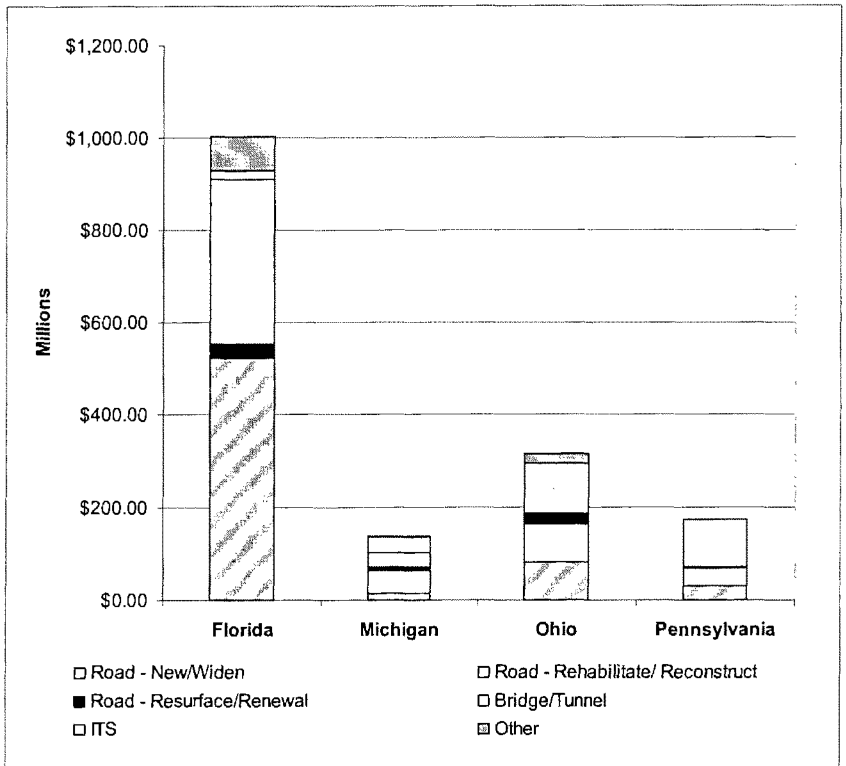
Exhibit III.3 Number of Design-Build Projects by Major State in SEP-14



Source: Design-Build Projects Approved Under SEP-14, Federal Highway Administration, July 2003

Exhibit III.4 shows the cost of design-build projects by type for the four major states. Florida has the largest overall design-build program in terms of cost, with Road-New/Widen and Bridge/Tunnel project types predominating. The other three states have significantly smaller design-build programs in terms of overall cost, with the largest program categories being Road-Rehabilitate/Reconstruct and Bridge/Tunnel. In Michigan, the ITS category stands out as an important type of project using design-build.

Exhibit III.4 Value of Design-Build Projects by Major State in SEP-14



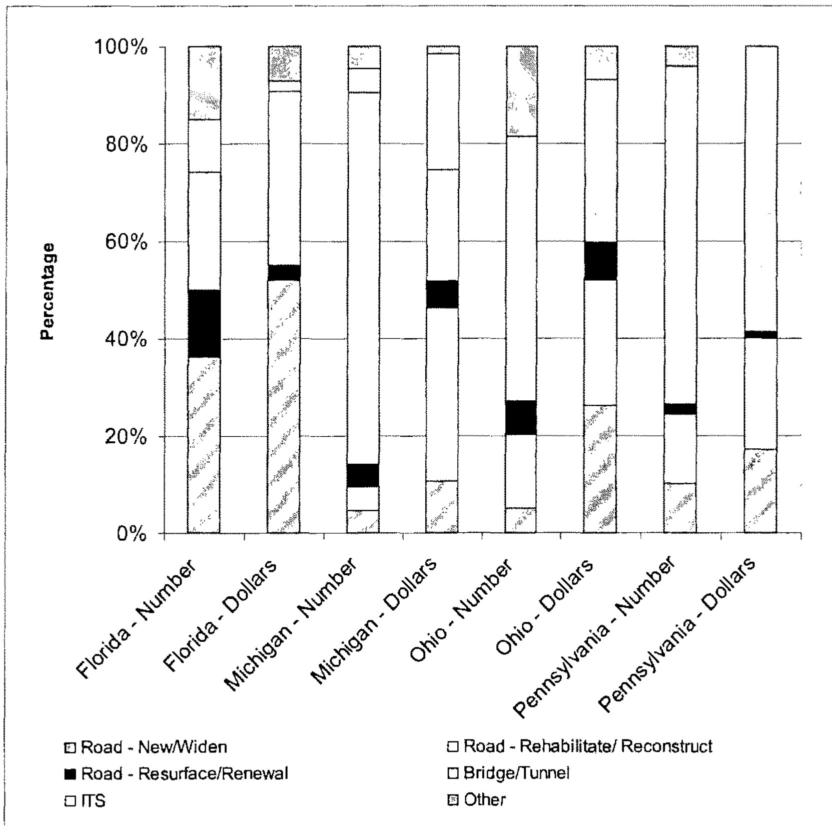
Source: Design-Build Projects Approved Under SEP-14, Federal Highway Administration, July 2003

Exhibit III.5 shows proportional breakdown of design-build projects by type for each of the four major SEP-14 states, in terms of both number of projects and program cost. This exhibit reveals the following characteristics of these programs:

- Florida's Road-New/Widen and Bridge/Tunnel projects are higher cost projects while its Road-Resurfacing and ITS projects are lower cost projects;
- Michigan's Road Rehabilitate/Reconstruct and ITS projects are higher cost projects while its Bridge/Tunnel projects are lower cost projects; and

- Ohio and Pennsylvania's Road-New/Widen and Road-Rehabilitate/Reconstruct projects are higher cost projects while their Bridge/Tunnel projects are lower cost projects. Neither state uses design-build for ITS projects to any noticeable extent.

Exhibit III.5 Percentage of Projects by Number and Dollars Expended by Type of Project by Major State in SEP-14



Source: Design-Build Projects Approved Under SEP-14, Federal Highway Administration, July 2003

The remaining states with active programs have far fewer design-build projects. Seventeen states have less than five proposed design-build projects. Twenty-six states completed less than

five design-build projects by the end of 2002. Some states have taken great advantage of the opportunity to apply design-build contracting, while many others are using the opportunity provided by SEP-14 on a much more selective, experimental basis.

This wide disparity in the use of design-build contracting between different regions of the country and different states could be due to a number of possible factors, including:

- Differences in the size of highway development programs;
- Varying state enabling legislation that in some cases limited the number of projects that could be piloted under the SEP-14 program;
- Newness of this project delivery approach and an agency's willingness to experiment with alternative methods of project delivery; or
- Different levels of tolerance for the uncertainty and perceived risks of this new project delivery approach.

While half the states have completed at least one design-build project under SEP-14, the use of design-build as a contract vehicle for highway capital projects varies greatly from state to state. Some states, such as Colorado DOT, Virginia DOT, and certain toll agencies in California have gone beyond design-build by sponsoring construction projects featuring design-build-operate-maintain contracting, in which a project developer bears responsibility not only for the design and construction of a highway (often a toll road) but also operations and maintenance responsibility for a fixed number of years. New Mexico and Virginia have coupled design-build with performance-based warranty programs, in which design-build teams are responsible for repairing certain deficiencies in highway performance for a given period of time.

Another variation is the scope of design-build work. Some states, including Georgia, Minnesota, Colorado, Utah, and Washington, have utilized or are considering design-build for certain mega-projects, including redevelopment of Interstate arteries through such cities as Rochester, Minn., Salt Lake City, and Seattle. Massachusetts is completing its first design-build project, the $385 million, 21-mile expansion of Route 3 North, while Oregon will use design-build under new legislation and regulations permitting public-private initiatives to expedite bridge and other road projects as part of a recent $400 million bond issue for highway construction.

Other states have proceeded more cautiously. Missouri has considered design-build contracting on a pilot basis but has yet to initiate their program. Ohio has let design-build projects with decreasing frequency in recent years, limiting design-build contracting to bridge re-decking and replacement projects and highway lighting in FY 2002 and FY 2003, as noted earlier. In Michigan, enabling legislation permits design-build contracting but there are claims that the technique does not allow the transportation agency to achieve its primary goal of minimizing impact to motorists. The legislature in New Hampshire, among other states, has failed to approve design-build contracting for highway projects. Despite a legislative prohibition against design-build contracting, the Texas Legislature in 2001 allowed up to four pilot projects to be developed under an arrangement similar to design-build, called a *comprehensive development agreement*.

* * * * * * *

This chapter demonstrates the diversity of programs and projects comprising the SEP-14 – Innovative Contracting program among the participating state and local transportation agencies. It also indicates the variety of approaches being taken by these agencies to apply design-build contracting, demonstrating the broad latitude individual state and local transportation agencies have to experiment, test, and apply design-build project delivery as part of their overall highway development programs.

Chapter IV presents the results of the design-build program and project surveys conducted during this study, as described in Chapter I. The findings derived from the survey responses provide the primary basis for addressing the issues and questions posed by Congress regarding the implications of design-build on the Federal-aid highway program, as expressed in Section 1307 (f) of TEA-21.

IV. FINDINGS

This chapter presents the results of the various fact-finding efforts performed during this study to address the issues and concerns posed by Congress in Section 1307(f) of TEA-21 regarding the application of design-build contracting to projects in the Federal-aid highway program. The study findings are organized into the following eight sections that include the areas of inquiry posed by Congress:

- Overview of SEP-14 design-build program
- Effects of design-build contracting on project duration
- Effects of design-build contracting on project cost
- Effects of design-build contracting on project quality
- Appropriate level of design for design-build procurements
- Impacts of design-build contracting on small businesses
- Degree of subjectivity used in design-build contracting
- Other design-build contract features

The impacts of delivery approach on project duration, cost, and quality, as reported by the respondents to the project surveys, are established by using several approaches whose combined results provide a profile of the prevalent effects of design-build versus design-bid-build project delivery. These approaches include the following:

- Project-specific impacts estimated by the responsible project manager relative to design-bid-build, based on the project surveys;
- Project-specific changes in actual project duration, cost, and quality during the development of the project based on actual project data provided by the responsible project manager, based on the project surveys; and
- Project-specific estimates and actual results for a comparable sample of similar design-build and design-bid-build projects provided by the respective project managers, based on the comparable project surveys.

The comparison of actual results for similar groupings of design-build and design-bid-build projects provides the most objective basis for determining the relative impacts of using each project delivery approach on project duration, cost, and quality. The small sample size for these direct comparisons limits the statistical representation of the results. However, by comparing the combined results for each group of projects, organized by project delivery approach, the results are more representative than would be provided by individual one-on-one comparisons. This is due to each project's inherent uniqueness and the potential for that uniqueness to skew the results in some way, thereby making the comparison less useful for the purpose of this study.

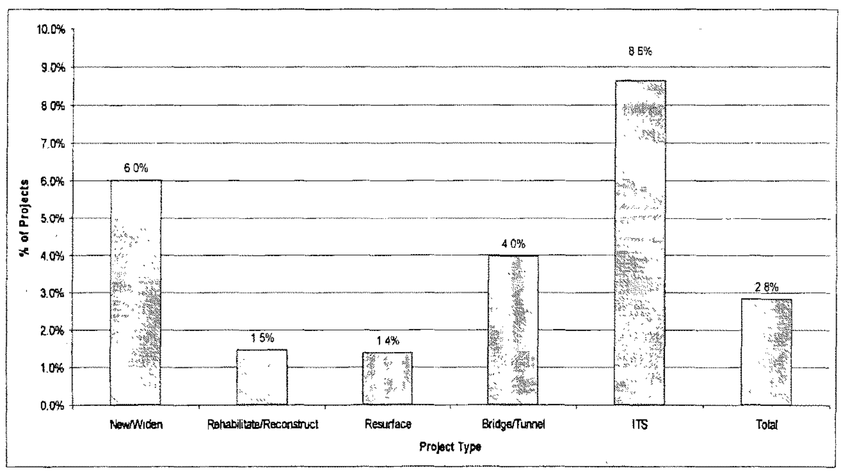
OVERVIEW OF SEP-14 DESIGN-BUILD PROGRAM

Out of the 29 STAs, toll agencies, and local public agencies (collectively referred to as agencies) that responded to the design-build program survey, 18 agencies provided information about the size of their overall design-build program compared to their total program, broken down by type of project. Given the difficulty of assigning costs for multi-year projects to a particular year, the survey requested information on the number and costs for design-build projects completed in 2002 (the last full year of design-build project activity prior to the conduct of the surveys for this study), and for all projects completed by the agency in that year. These responses enabled the research team to assess the relative size of agency design-build programs when compared to the total agency program, by type of project and overall. The results of these responses are described below.

Extent of Design-Build Program

The responding agencies with design-build programs completed 73 design-build projects in calendar year 2002, representing a reported $1.2 billion in costs. This compared to 3,034 total projects completed that same year, at a total cost of $7.4 billion. Hence, while design-build projects represented only 2.8 percent of the total projects completed in 2002 for these combined agencies, they comprised 25.5 percent of the total costs for these projects. This is illustrated in Exhibits IV.1 and IV.2 in the "Total" column for each exhibit respectively.

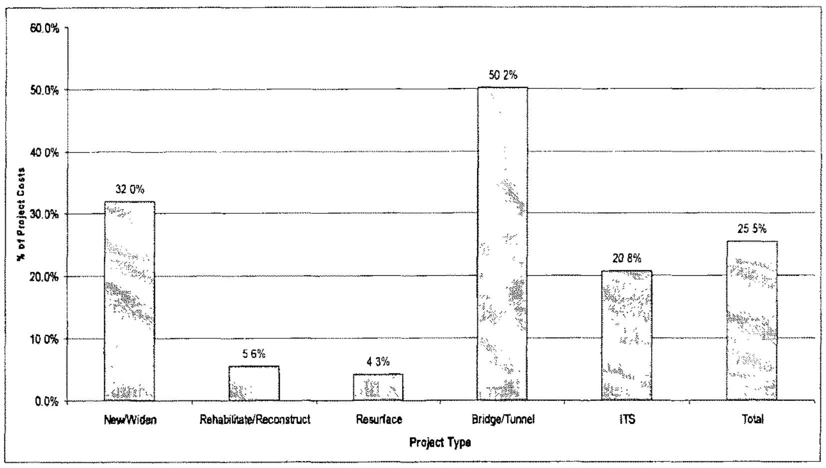
Exhibit IV.1 Design-Build Projects as a Proportion of Total Projects Completed in 2002 for Responding Agencies



Source: D-B program survey: Q18, 13 responses

Exhibit IV.1 shows the proportion of projects completed in 2002 by responding agencies that were delivered using the design-build approach. The largest proportion of projects using design-build were for ITS, Road-New/Widen, and Bridge/Tunnel, ranging from 4 percent to 9 percent. In terms of number of projects, design-build remains a small percentage of the total programs in responding agencies at 2.8 percent.

Exhibit IV.2 Design-Build Project Costs as a Proportion of Total Project Costs Completed in 2002 for Responding Agencies

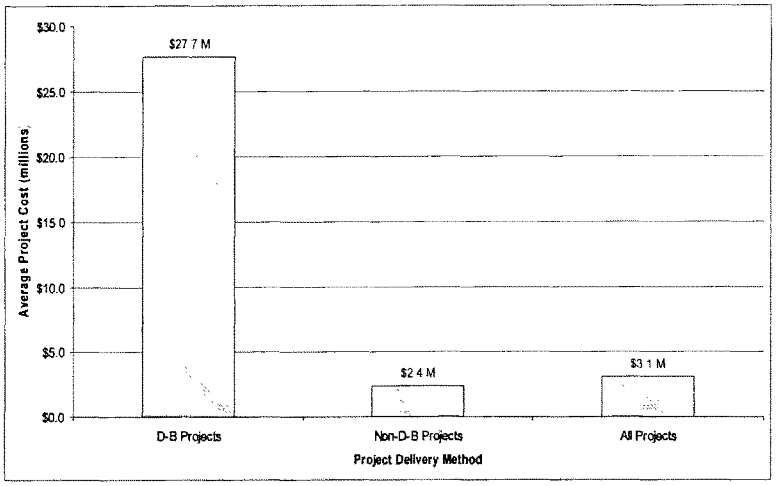


Source: D-B program survey: Q18, 13 responses

Exhibit IV.2 shows the proportion of overall design-build program costs for projects completed in 2002 by responding agencies. These percentages are much higher than in Exhibit IV.1 for all project types. While the proportion of project costs remains highest for the same project types as shown in Exhibit IV.1, the relative positions have shifted to favor more costly and perhaps risky project categories, such as Bridge/Tunnel and Road-New/Widen projects. These two project types show the highest increase in percentage when measuring the cost of projects versus the number of projects completed in 2002.

The higher percentage of total project costs using design-build indicates that in most cases, design-build projects tended to be significantly larger, more complicated projects. This is confirmed by Exhibit IV.3, which shows that the average cost of design-build projects completed in 2002 by agencies responding to the design-build program survey was $27.7 million, more than eleven times the average cost of all other projects completed that year (just under $2.4 million).

Exhibit IV.3 Average Project Costs by Delivery Method
Design-Build verses Non-Design-Build



Source: D-B program survey: Q18, 13 responses

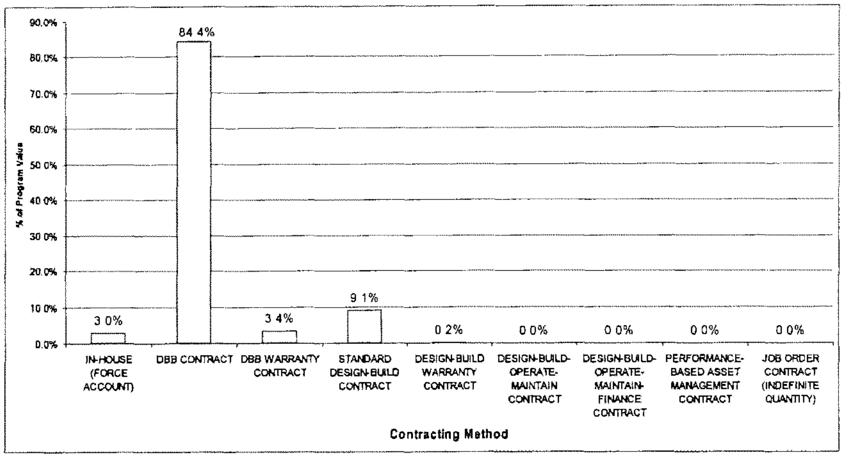
Contracting Methods Used by States with Design-Build Programs

The most frequently used contracting method reported by agencies in the design-build program survey is traditional design-bid-build, either by itself or combined with some kind of warranty (either material and workmanship or performance). As shown in Exhibit IV.4, 87 percent of the value of agency highway programs is reported to be delivered using some form of design-bid-build. Second in popularity is design-build, either alone or in combination with a warranty, which represents just over 9 percent of the program value. Besides in-house (force account) work, there is no other project delivery method with any significant use by the reporting agencies.

The predominant use of design-bid-build contracting applies across all types of projects, as shown in Exhibit IV.5. Design-build is most prevalent for Road-New/Widen, Rehabilitation/Reconstruct, and Bridge/Tunnel project types, ranging from 8 percent to 11 percent of the projects. The use of design-bid-build contracting ranges from 83- to 95-percent. This is a higher percentage than reported in Exhibit IV.1, which reflects only projects completed in 2002.

Design-build program managers responding to the program surveys estimated only about 2 percent of the design-build projects involved some other innovative contracting approach. In contrast, 21 percent of the design-build projects reported by design-build project managers involved another innovative contracting approach.

Exhibit IV.4 Contracting Methods Used for Agency Programs



Source: D-B program survey: Q19, 21 responses

Exhibit IV.5 Contracting Methods Used by Project Type

PROJECT TYPE	IN-HOUSE (FORCE ACCOUNT)	DESIGN-BID-BUILD CONTRACT	DESIGN-BID-BUILD WARRANTY CONTRACT	DESIGN-BUILD CONTRACT
New/Widen	2.6%	83.1%	3.2%	11.2%
Rehab/Reconstruct	2.9%	84.3%	3.9%	8.9%
Resurface	4.7%	84.6%	3.5%	7.2%
Bridge/Tunnel	2.5%	85.8%	3.2%	8.4%
ITS	0.0%	94.5%	0.0%	5.5%
All Project Types	**3.0%**	**84.4%**	**3.4%**	**9.3%**

Note: The Design-Build Contract column includes both Design-Build and Design-Build Warranty contracts.
Source: D-B program survey: Q19, 21 responses.

The distribution of innovative contracting approaches for the full sample of design-build projects surveyed was as follows:

- 20 percent were design-build-warranty;
- 1 percent were design-build-operate-maintain or DBOM; and
- 79 percent were straight design-build.

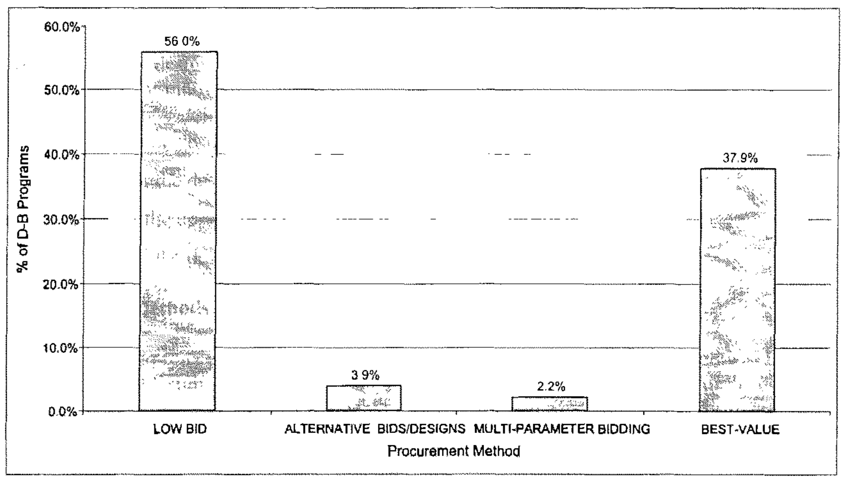
For the subset of design-build projects that were compared to similar design-bid-build projects, the distribution of innovative contracting approaches was as follows:

- 5 percent of the design-build projects were DBOM;
- 95 percent of the design-build projects were straight design-build;
- 5 percent of the design-bid-build projects were design-bid-build-warranty; and
- 95 percent of the design-bid-build projects were straight design-bid-build.

Procurement Methods Used for Design-Build Projects

For design-build projects completed in 2002, the predominant procurement method was Low Bid, as shown in Exhibit IV.6 at 56 percent. Best Value was used for 38 percent of the design-build projects. The only other procurement methods indicated were Alternative Bids/Designs and Multi-Parameter Bidding, each representing about 2 percent. This is in marked contrast to design-bid-build projects that were overwhelmingly low-bid based.

Exhibit IV.6 Procurement Methods Used for Design-Build Projects



Source: D-B program survey: Q20, 14 responses

As shown in Exhibit IV.7, this distribution is representative of most of the project types, including Road New/Widen, Rehabilitate/Reconstruct, and Resurface. ITS projects show an even split between Low Bid and Best-Value.

Exhibit IV.7 Procurement Methods Used for Design-Build Projects by Project Type

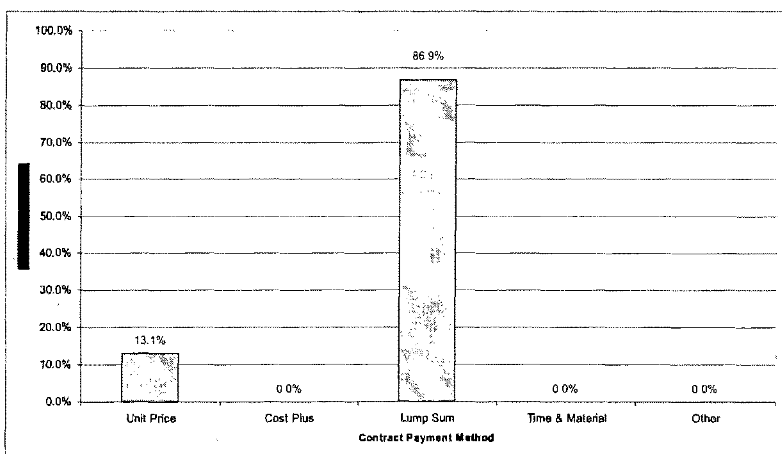
PROJECT TYPE	LOW BID	ALTERNATIVE BIDS/DESIGNS	MULTI-PARAMETER BIDDING	BEST-VALUE
New/Widen	54.2%	0.0%	2.9%	42 9%
Rehab/Reconstruct	64.9%	0 0%	1 7%	33 3%
Resurface	59.0%	0 0%	1 0%	40.0%
Bridge/Tunnel	56 6%	8.3%	1.7%	33 4%
ITS	48.6%	0.0%	1 3%	50.1%
All Project Types	**56.0%**	**3.9%**	**2.2%**	**37.9%**

Source: D-B program survey: Q20, 14 responses

Payment Methods Used by States with Design-Build Programs

The preferred payment method for design-build projects is lump sum, as shown in Exhibit IV.8. The only other payment method noted is Unit Price at 13 percent. This payment preference occurs for all project types, as shown in Exhibit IV.9, and reflects the transfer of project risk to the design-builder who is held responsible for satisfactory project completion and paid on that basis. The small portion of the design-build project costs falling under unit pricing is primarily due to the use of a combination approach to payment methods, whereby certain items are paid for on a unit price basis, while the majority of items are included in the lump sum (fixed price).

Exhibit IV.8 Payment Methods Used for Design-Build Projects



Source: D-B program survey: Q21, 16 responses

Exhibit IV.9 Payment Methods Used for Design-Build Projects by Project Type

PROJECT TYPE	UNIT PRICE	LUMP SUM
New/Widen	17%	83%
Rehab/Reconstruct	11%	89%
Resurface	13%	88%
Bridge/Tunnel	10%	90%
ITS	14%	86%
All Project Types	**13%**	**87%**

Source: D-B program survey: Q21, 16 responses

Suitability of Design-Build Project Delivery

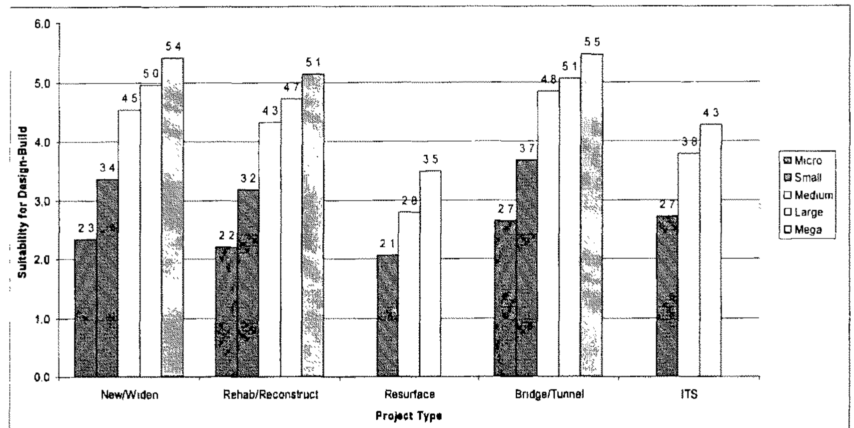
Projects of many sizes and complexities have used design-build project delivery over the years since the inception of the SEP-14 Innovative Contracting program, as shown in Exhibit III.3 in the last chapter. However, as Exhibit III.4 revealed, the overwhelming majority of SEP-14 program costs have been for projects over $100 million in cost. This reflects the perceptions of design-build program managers surveyed for this study. Based on the results of the program survey, design-build program managers rated the following project types as most suitable for design-build project delivery, as shown in Exhibit IV.10:

- Road-Rehabilitate/Reconstruct
- Bridge/Tunnel
- Road-New/Widen

Least suitable among the project types is Road-Resurface. The suitability rating for design-build contracting is highly correlated to the size of the project, wherein the suitability rating more than doubles when going from small projects to mega projects. When deciding which projects to apply design-build contracting, medium to large projects (over $10 million) are considered the most suited to this project delivery approach.

When asked to rate the degree to which design-build project delivery would likely be used in the future, managers of design-build programs indicated a modest level of use (average rating of 2.9 out of a possible 6.0) for all project types, as shown in Exhibit IV.11. The most likely project types to use design-build in the future were Road-New/Widen and Rehabilitate/Reconstruct. The least likely project type for design-build was perceived to be Road-Resurface. This is indeed reflective of the actual usage statistics for the SEP-14 Design-Build Program provided in Chapter III.

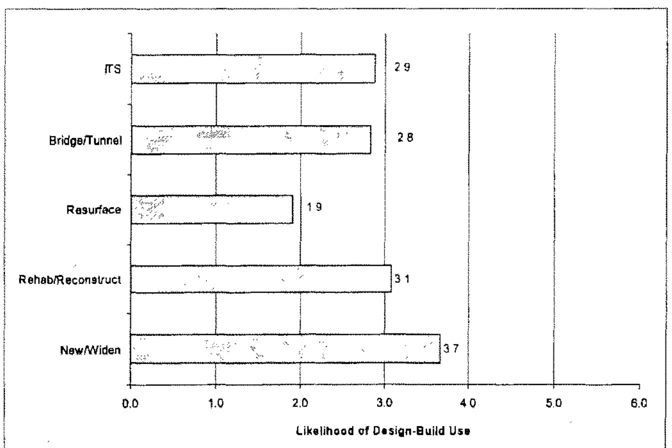
Exhibit IV.10 Perceived Suitability of Design-Build Project Delivery (Scale: 1 – Not Suitable; 6 – Highly Suitable)



Key: Micro - less than $2 million; Small - $2-10 million; Medium - $10-50 million; Large - $50-100 million; Mega - over $100 million

Source: D-B program survey: Q22, 26 responses

Exhibit IV.11 Likely Future Use of Design-Build Project Delivery (Scale: 1 – None; 6 – Significant)



Source: D-B program survey: Q23, 27 responses

Legislative and Policy Requirements

Seventy-two percent of the agencies responding to the design-build program survey needed special permission or legislation to use design-build contracting. Half of the agencies with design-build programs required special legislation. Other requirements or restrictions included:

- Adoption of another state agency's design-build authority and/or process
- Project-specific approval by head of agency
- Minimum project size

Fifty-nine percent of the agencies have developed written policies to guide their design-build programs. Seventy-one percent of these agencies had these policies in place before the first design-build project was initiated. The level of involvement by transportation agencies in formulating these policies ranged from none to very significant, with most having a modest to moderate level of involvement (averaging 3.6 on a 6-point scale). These results reveal the significant statutory and regulatory impediments that had to be overcome to enable agencies to apply SEP-14.

Adequacy of Design-Build Procurement and Contract Administration Procedures

Respondents to the design-build program survey generally characterized their agency's design-build procurement and contract administration procedures as adequate (averaging 4.7 on a 6-point scale for both). They also rated the resource levels available for procuring and administering design-build contracts as adequate (averaging 4.5 on a 6-point scale for both).

Among the contract administration procedures used for design-build projects, all of the respondents to the design-build program survey verified compliance with contract requirements as the project progressed to completion and/or upon project completion. Several of these agencies also had contract compliance verifications performed after project completion due to the inclusion of warranties. These verification procedures were specified in the design-build contract documents of the responding agencies.

EFFECTS OF DESIGN-BUILD CONTRACTING ON PROJECT DURATION, COST, AND QUALITY

Three of the key issues raised by Congress in requesting this study of design-build contracting in the Federal-aid highway program were the relative impacts of project delivery on project duration, cost, and quality. As part of this study, design-build project managers in STAs, toll agencies, and local transportation agencies involved in the SEP-14 program were surveyed to obtain available data and their perspectives concerning these three dimensions for specific design-build projects they were responsible for. As part of the project survey instrument, the respondents were asked to provide their best estimate of the percentage change in project duration, cost, and quality as a result of the design-build approach. The results of their responses are summarized in Exhibit IV.12 below. While this data reflects the recollections of design-build project managers and therefore may not be based on actual project records, it provides useful

insight into how design-build project managers view their experience with a specific design-build project delivery.

Exhibit IV.12 Summary of Estimated Impacts of Using Design-Build on Project Duration, Cost, and Quality

Duration Dimension	Value	Cost Dimension	Value	Quality Dimension	Value
Responses	62	Responses	48	Responses	61
Average	**-14.1%**	**Average**	**-2.6%**	**Average**	**0.0%**
Median	-10.0%	Median	0.0%	Median	0.0%
Mode	-0.1%	Mode	0.0%	Mode	0.0%
Maximum	50 0%	Maximum	65.0%	Maximum	10.0%
Minimum	-63.0%	Minimum	-61.8%	Minimum	-10.0%
Standard Deviation	**24.4%**	**Standard Deviation**	**20.5%**	**Standard Deviation**	**2.1%**

Source: D-B project survey: Q18, 48-62 responses

Exhibit IV.12 reveals that on average, the design-build projects had a distinctly greater potential for schedule reduction than cost reduction, as estimated by design-build project managers in their completed design-build project surveys. The average reduction in project duration was 14 percent, while the average reduction in project cost was almost 3 percent. There was no appreciable difference in project quality associated with project delivery approach, with most indicating no change. For both duration and cost impacts, there was a wide range of impacts, both positive and negative, that is reflected in the high standard deviations in these two data sets. This suggests that many other factors besides delivery approach impact the duration and cost of projects.

The following sections discuss in greater detail the impacts of design-build versus design-bid-build project delivery on the duration, cost, and quality of highway infrastructure projects developed under the SEP-14 program. The first section addresses the issue of project duration.

EFFECTS OF DESIGN-BUILD CONTRACTING ON PROJECT DURATION

The impacts of project delivery approach on project duration and the potential for project duration to change during the development process are presented in several ways in this section. This variety of information reflects the different ways in which survey participants responded to questions concerning the duration of design-build projects by project phase and relative to similar design-bid-build projects. Some of the information is based on estimates provided by survey respondents, while other information is based on actual data from sampled design-build projects and, when provided, from similar design-bid-build projects. When taken together, these various results provide a profile of schedule impacts that is indicative of the influence that the choice of project delivery approach can have on project length, both total and by phase.

The effect of project delivery on project duration can be determined in a number of ways. One way is to ask managers of actual design-build projects to estimate the impact of design-build project delivery on overall project duration. Another way is to compare the differences between planned and actual duration of project phases as the project moves from RFP development to completion. The effects of design-build project delivery on overall project and phase duration were developed in this study based on the combined results for the 69 completed project surveys, using respondent estimates and actual project schedule data.

A third method of measuring the impact of project delivery approach on project duration is to use cross-sectional data to compare the relative changes in project duration during the phases of project development between similar design-build and design-bid-build projects. This can be done by comparing either individual results for two very similar projects or the average results for a group of similar pairs of projects. Reported project-specific schedule changes by phase varied widely between different pairs of similar design-build and design-bid-build projects. To avoid the problem of the inherent differences between individual projects distorting the reported results, the analysis was based on comparing the average results by project delivery approach for the paired reported projects.

Out of the 17 pairs of projects reported, 11 pairs had sufficient data reported in the completed surveys to enable changes in project duration by phase to be developed. It should be noted that this is a relatively small sample that may not be statistically representative of the SEP-14 Program of projects or design-bid-build projects. Hence care needs to be taken in developing or applying any conclusions that are based on the results from this sample of paired design-build and design-bid-build projects.

Estimated Impacts of Design-Build on Project Duration

The project survey results revealed that design-build project delivery, in comparison to design-bid-build, had a mixed impact on project duration depending on the project type, complexity, and size. As Exhibit IV.13 shows, the estimated impacts of project delivery on project schedule resulted in a wide range of schedule variations, ranging from a 63-percent reduction to a 50-percent increase. This is reflected in the high standard deviation for this sample of estimates.

Exhibit IV.13 Estimated Change in Project Duration due to Design-Build Project Delivery

Duration Dimension	Value
Responses	62
Average	**-14.1%**
Median	-10.0%
Mode	-0.1%
Maximum	50.0%
Minimum	-63.0%
Standard Deviation	**24.4%**

Source: D-B project survey: Q18

When considered as a group, the surveyed design-build project managers estimated an average decrease of 14 percent in delivery time relative to design-bid-build. Out of 62 responses, 45 estimates were for schedule reductions and only 7 estimates indicated a schedule increase. Overall, 89 percent of the design-build project managers estimated no increase in project duration due to the application of design-build. These results suggest that from the perspectives of design-build project managers, project delivery approach (i.e., design-build versus design-bid-build) can be a significant factor in controlling and expediting project delivery schedules.

The range and average differences in procurement and contract administration time between design-build and design-bid-build project delivery approaches, as estimated by program survey respondents, is illustrated in Exhibit IV.14. Program survey respondents estimated that the time required for procurement of design-build contracts versus design-bid-build contracts ranged from 45-percent less to over 100-percent more time, with an average increased procurement time of 15 percent for design-build contracts. About two-thirds of the program survey respondents believed design-build projects had a longer procurement time than design-bid-build projects. In contrast, the actual time required for the administration of design-build contracts ranged from 75 percent less to 55 percent more time, with an average decrease in contract administration time of 3 percent for design-build contracts.

Exhibit IV.14 Range and Average Differences in Procurement and Contract Administration Time for Similar Design-Build and Design-Bid Build Projects

Activity	Average	Maximum	Minimum
Contract Administration	**-2.8%**	55.0%	-75.0%
Procurement	**15.0%**	105.0%	-45.0%

Source: D-B program survey: Q12, 27 responses

These results suggest that design-build projects are perceived to take more time to set up and procure, but once awarded, require slightly less time for the contracting agency to administer in comparison to similar design-bid-build projects. The wide variation in responses reflects the newness of design-build procurement and contract administration processes and the diversity of project types and sizes for which design-build project delivery is used by transportation agencies.

Planned versus Actual Project Duration

Another consideration is how the duration of design-build projects changed from what was planned to what actually occurred. To provide the same basis for comparing project duration between design-build and design-bid-build project, total project duration is defined in this section as the time from advertising the design-build project (following preparation of the RFP), to completing the project as signified by contracting agency acceptance. Construction phase duration is defined as the time from initiating construction activity to acceptance of the project by the contracting agency.

Relative to what was planned before the surveyed projects began, total project duration declined by 0.9 percent on average while construction duration increased by 1.0 percent. Exhibit IV.15 shows a wide range of differences between planned and actual delivery times for the surveyed design-build projects. The same number of projects experienced a decrease in duration (15) as experienced an increase in duration (15) for the total project and construction phase. Four of the reported design-build projects did not experience any change in total project or construction phase duration.

Exhibit IV.15 Range and Average Differences in Planned versus Actual Total Project and Construction Phase Duration for Design-Build Projects

Project Phase	Average	Maximum	Minimum	Standard Deviation
D-B Constuction Phase	**1.0%**	67.5%	-54.7%	28.5%
D-B Total Project	**-0.9%**	31.9%	-35.5%	15.4%

Source: D-B project survey: Q15, 51 responses for construction phase and 34 responses for total project

Design-Build versus Design-Bid-Build Project Duration

Another indication of the effect of design-build project delivery on project duration is obtained from the subset of 11 comparable design-build and design-bid-build project surveys completed for this study. For the purposes of this analysis, the time associated with preparation of procurement documents prior to advertising for bid is excluded from the definition of total project duration in Exhibit IV.16. This includes:

- Request for qualifications (RFQ) and request for proposal (RFP) for the single-phase, two-step design-build procurement process; and
- Prequalification and invitation for bids (IFB) for the two-phase design-bid-build procurement process

The pre-advertisement phase is subject to numerous influences beyond the control of contracting agency or respondents and not related to the choice of project delivery method.

Exhibit IV.16 Average Percent Change in Planned Versus Actual Total Project and Construction Phase Durations For Similar Design-Build and Design-Bid-Build Projects

Project Phase	Average	Maximum	Minimum	Standard Deviation
D-B Constuction Phase	**-1.2%**	30.6%	-54.7%	27.3%
D-B-B Construction Phase	**11.6%**	71.7%	-27.2%	28.7%
D-B Total Project	**-4.2%**	23.1%	-42.5%	20.8%
D-B-B Total Project	**4.8%**	30.6%	-20.9%	14.9%

Source: similar D-B and D-B-B project surveys: Q15, 11 responses per survey type

As shown in Exhibit IV.16, on average the design-build projects achieved shorter total project duration and construction duration than originally planned. In contrast, the similar design-bid-build projects incurred longer timeframes, on average, for both total project and construction phase durations than originally planned. The subset of design-build projects reduced the planned project duration by an average of 4 percent, while the comparable design-bid-build projects increased total project duration by an average of 5 percent. This represents a 9-percentage point differential in total project duration between similar sets of design-build and design-bid-huild projects.

Meanwhile, the subset of design-build projects had a decreased construction duration averaging 1 percent, while the comparable design-bid-build projects increased construction duration by an averaging 12 percent. This represents a 13-percentage point difference between actual and planned project timeframes.

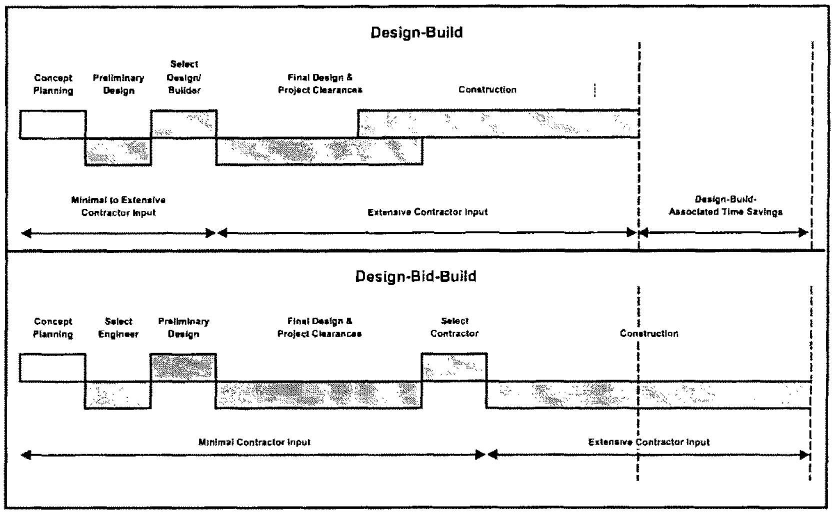
The results of the program and project surveys, including both project manager estimates and actual project documentation, supports the claim that the design-build approach can reduce the overall duration of a project, in certain eases significantly. Despite wide variations in changes to project duration among the surveyed design-build and design-bid-build projects, particularly for the construction phase, the results revealed that longer than planned contract development and evaluation timeframes and potentially longer construction timeframes could be more than offset by certain features of the design-build process. These features included:

- Eliminating the need for a second procurement eycle by combining contracting for design and construction contracts;
- Integrating these functions during the project development lifecycle, while design-bid-build keeps them contractually separate;
- Creating an incentive for improved designs that are more constructible and require fewer design "fixes" through change and extra work orders; and
- Allowing parallel processing of activities occurring on different portions of a project while design-bid-build keeps them sequential.

Exhibit IV.17 illustrates the general sequence of project development activities for both design-build and design-bid-build contracts. The two schedules demonstrate how the type of project delivery approach may influence the sequencing and duration of standard highway project development phases. The key feature that distinguishes these two project delivery approaches is the placement of design functions relative to the construction functions and the potential for overlap between the design and construction phases for the design-build approach.

These factors resulted in shorter total project durations than originally planned on average for the surveyed design-build projects, whereas these same timeframes increased for the surveyed design-bid-build projects. Interestingly, for the sampled design-build and design-bid-build pairs, the average planned project duration (excluding procurement document preparation) was longer for the design-build projects as a group, but actual project duration was shorter.

Exhibit IV.17 Sequence of Project Delivery Activities by Contract Approach



Source: Dr. Keith Molenaar, University of Colorado at Boulder

The ability for design-build contractors to have greater control to better integrate the design and construction functions and to use parallel processing of certain functions previously required by contract and regulation to be done sequentially provide significant opportunities for trimming the time it takes to deliver a design-build project in comparison to its design-bid-build counterpart. Numerous respondents to the project surveys noted the ability to expedite a needed project as the primary motivation for using the design-build approach to project delivery.

EFFECTS OF DESIGN-BUILD CONTRACTING ON PROJECT COSTS

As with the previous section on project duration, the impacts of project delivery approach on project cost and the potential for project cost to change during the development process are presented in several ways in this section. This variety of information reflects the different ways in which survey participants responded to questions concerning the costs of specific design-build projects by project phase and relative to similar design-bid-build projects. Some of the information is based on estimates provided by project survey respondents and some of the information is based on actual cost data provided for sampled design-build projects and, when provided, similar design-bid-build projects. When taken together, these various results provide a profile of cost impacts that is indicative of the various impacts that the choice of project delivery approach can have on project costs, both total and by phase.

The effect of project delivery on project costs can be measured in a number of ways. One method is to use time series data to compare the level of project cost as the project moves from budget to contract to completion. Three measures of project cost change are developed in this section based on the phase of the project development process:

- Pre-Contract Cost Change: the percent difference between contract and budget cost levels (i.e., [contract cost - budget cost]/budget cost), which measures what happens to project cost levels as the project moves from concept to contract.
- Contract Cost Change: the percent difference between final delivered cost and contract cost levels (i.e., [delivered cost - contract cost]/contract cost), which measures what happens to project cost levels during the design-build or construction contract.
- Total Project Cost Change: the percent difference between final delivered cost and budget cost levels (i.e., [delivered cost - budget cost]/budget cost), which measures what happens to project cost levels from concept to completion.

Average project cost changes by phase were developed in this study based on the combined results for the 69 completed project surveys, using actual project cost data. This provided the largest sample to determine these cost change impacts for design-build projects in the study.

As with project duration, another method of measuring the impact of project delivery approach on project cost is to compare the relative changes in project cost during the phases of project development between similar design-build and design-bid-build- projects. This can be done by comparing either individual results for two very similar projects or the average results for a group of similar pairs of projects. Project-specific cost changes by phase vary widely between different pairs of similar design-build and design-bid-build projects. To avoid the problem of the inherent differences between individual projects overly distorting the reported results, the analysis is based on comparing the average results by project delivery approach for the group of paired projects.

Out of the 17 pairs of projects reported, 11 pairs had sufficient data reported in the completed surveys to enable changes in project costs by phase to be developed. It should be noted that this is a relatively small sample that may not be statistically representative of the SEP-14 Program of projects or design-bid-build projects. Hence care needs to be taken in developing or applying any conclusions that are based on the results from this sample of paired design-build and design-bid-build projects.

Estimated Impacts of Design-Build on Project Cost

The project survey results revealed that design-build project delivery, in comparison to design-bid-build, had a mixed impact on project cost depending on the project type, complexity, and size. As Exhibit IV.18 shows, the estimated impacts of project delivery on project cost were wide-ranging, extending from a 62-percent reduction to a 65-percent increase. This is reflected in the high standard deviation for this sample of estimates.

Exhibit IV.18 Estimated Change in Project Cost due to Design-Build Project Delivery

Cost Dimension	Value
Responses	48
Average	**-2.6%**
Median	0.0%
Mode	0.0%
Maximum	65.0%
Minimum	-61.8%
Standard Deviation	**20.5%**

Source: D-B project survey: Q18

When considered as a group, the surveyed design-build project managers estimated an average decrease of 2.6 percent project cost relative to design-bid-build. Out of 48 responses, 20 estimates were for cost reductions, 17 for no change, and 11 for a cost increase. Overall, 77 percent of the design-build project managers estimated no increase in project cost due to design-build. These results suggest that from the perspectives of design-build project managers, project delivery approach (i.e., design-build versus design-bid-build) can be a contributing factor in controlling and potentially reducing project costs. However, project delivery approach is perceived to be less of a factor in affecting project cost than other characteristics of the project or its participants.

Reported Impacts of Design-Build on Project Cost

When actual project cost information is used from the project surveys, the design-build projects on average experienced no appreciable change in total cost (ranging from a decrease of 42 percent to an increase of 63 percent). As shown in Exhibit IV-19, this resulted from an average cost decrease of 2.3 percent between concept budget and contract, and an average cost increase of 3.2 percent during the contract phase.

When considering individual project results, the zero percent average total project cost change was the result of off-setting cost increases and cost decreases that both varied widely. Slightly more of the surveyed design-build projects experienced a decline in total project cost from budget to completion than experienced an increase, although the cost increases tended to be a somewhat higher percentage than the cost decreases per project. One-half of the design-build projects experienced a change in total cost within plus or minus 10 percent. One-quarter of the design-build projects experienced a decline in total cost of 10 percent or more and one-quarter experienced an increase of 10 percent or more.

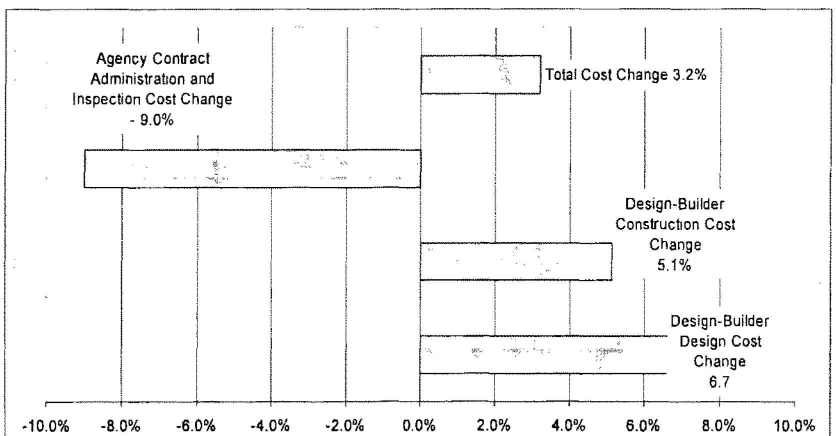
Exhibit IV.19 Reported Change in Project Costs for Surveyed Design-Build Projects

Dimension	Award Growth ((Award-Budget)/ Budget)	Contract Growth ((Final-Award)/ Award)	Total Growth ((Final-Budget)/ Budget)
Responses	36	36	36
Average	**-2.3%**	**3.2%**	**0.0%**
Median	-0.1%	0.5%	-0.9%
Mode	0.0%	0.0%	N/A
Maximum	63%	37%	63%
Minimum	-45%	-42%	-42%
Standard Deviation	**21%**	**12%**	**22%**

Source: D-B project survey: Q16

In considering the average 3.2 percent increase in cost during the contract phase, most of the increase was due to design-builder increases of 5 to 7 percent, as shown in Exhibit IV-20.

Exhibit IV.20 Reported Changes in Design-Build Project Costs after Contract Execution



Source: D-B project survey: Q16, 36 responses

The major compensating factors were decreases in the administrative costs to the contracting agency for preliminary engineering, contract preparation, contract administration, and quality control inspections, all of which represent significantly smaller portions of the project costs.

Comparison of Reported Project Cost Change Between Design-Build and Design-Bid-Build Project Delivery

The design-bid-build projects demonstrated somewhat more favorable cost results than their design-build project counterparts, as shown in Exhibit IV.21. As indicated by the results, there is a wide range of project costs for each project phase that is reflected by the large standard deviations shown for both design-build and similar design-bid-build survey samples. This suggests that many other factors besides project delivery approach are influencing the results.

Exhibit IV.21 Supporting Data for Reported Changes in Project Costs for Similar Design-Build and Design-Bid-Build Projects

Design-Build Projects

Dimension	Award Growth ((Award-Budget)/ Budget)	Contract Growth ((Final-Award)/ Award)	Total Growth ((Final-Budget)/Budget)
Responses	11	11	11
Average	**1.9%**	**6.0%**	**7.4%**
Median	2.4%	1.6%	2.4%
Mode	N/A	N/A	N/A
Maximum	23%	21%	40%
Minimum	-41%	-4%	-28%
Standard Deviation	**17%**	**9%**	**17%**

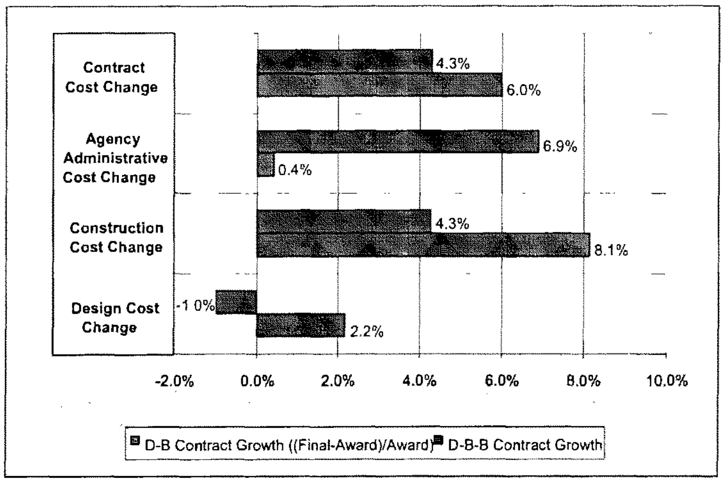
Design-Bid-Build Projects

Dimension	Award Growth ((Award-Budget)/ Budget)	Contract Growth ((Final-Award)/ Award)	Total Growth ((Final-Budget)/Budget)
Responses	9	9	9
Average	**-1.4%**	**4.3%**	**3.6%**
Median	-0.9%	0.4%	-3.9%
Mode	N/A	N/A	N/A
Maximum	27%	29%	64%
Minimum	-18%	-3%	-13%
Standard Deviation	**15%**	**10%**	**24%**

Source: similar D-B and D-B-B project surveys: Q16

In considering the increases in cost during the contract phase of both the subset of design-build projects and similar design-bid-build projects, most of the increases occurred during the construction phase of the projects, as shown in Exhibit IV.22. For this small sample of similar projects, there was less cost growth indicated for the design-bid-build projects.

Exhibit IV.22 Comparison of Actual Reported Changes in Project Costs after Contract Execution for Similar Design-Build and Design-Bid-Build Projects



Source: similar D-B and D-B-B project surveys: Q16, 9-11 responses per survey type

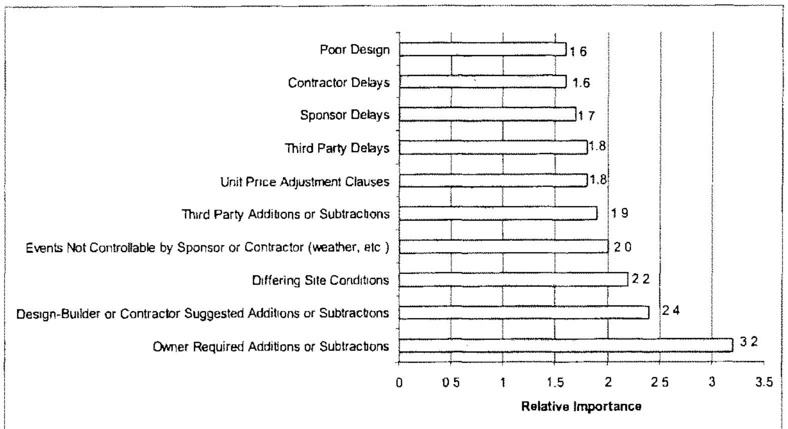
Causes of Project Cost Changes

As noted earlier, project costs tend to experience most cost growth from contract award to project completion. Respondents to the design-build project survey were asked to rate the reasons for major changes in project costs (using a six-point scale ranging from "No Impact" (0) to "Major Impact" (6). This resulted in a series of ratings for the various factors listed in Exhibit IV.26, many of which are outside the control of the design-builder.

According to Exhibit IV.23, the leading cause of project cost changes was change orders: Owner required additions or subtractions had an average rating of 3.2, followed by design-builder or contractor suggested additions or subtractions at 2.4. The relative impacts of other factors on the cost of design-build projects are also shown below, with most between 1.6 and 2.0.

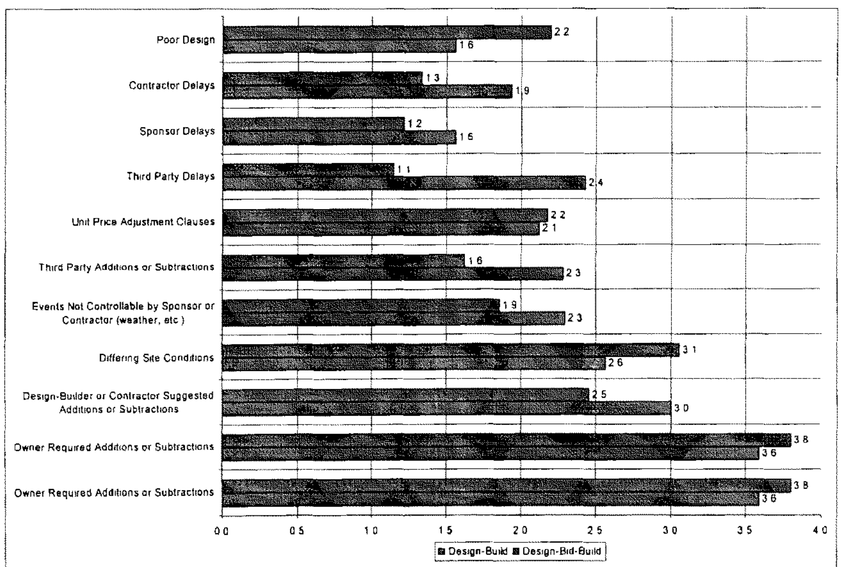
When the subset of design-build projects is compared to similar design-bid-build projects, as shown in Exhibit IV.24, the results reveal similar ratings of the causes of project cost changes for the two project delivery approaches. This suggests that both project delivery approaches are sensitive to similar factors, with design-build projects being significantly more sensitive to delays, additions, or subtractions caused by third parties than design-bid-build.

Exhibit IV.23 Causes of Cost Changes for Design-Build Projects



Source: D-B project surveys: Q16, 64 responses

Exhibit IV.24 Causes of Cost Changes for Similar Design-Build and Design-Bid-Build Projects



Source: similar D-B and D-B-B project surveys: Q16, 17 responses per survey type

Change Orders and Claims

As noted above, a significant factor affecting project cost, as well as project duration and quality, is change orders. Exhibit IV.25 lists the number and effect of change orders, as well as claims, on the costs of design-build projects surveyed during the study.

Exhibit IV.25 Reported Change Order and Claim Activity for Design-Build Projects

Change Order Dimension	Change Orders Per Project	Change Order Costs Per Project ($000)	Cost Per Change Order ($000)	Claims Per Project	Claims Cost Per Project ($000)
Responses	61	61	61	62	62
Average	**18**	**$3,722**	**$122**	**0.3**	**$80**
Median	8	$400	$29	0	$0
Mode	0	$0	$0	0	$0
Maximum	187	$73,000	$1,169	5	$3,000
Minimum	0	$0	$0	0	$0
Standard Deviation	**30**	**$12,813**	**$237**	**1**	**$429**

Source: D-B project survey: Q16

Change orders represented 4.7 percent of the total costs for the surveyed projects. The average total value of change orders per project was $3.7 million. On average, reported design-build projects experienced 18 change orders per project. Out of 61 design-build projects reported, seven had more than 40 change orders. Only 12 projects had change orders with a total value of greater than $2 million. The average design-build change order equaled $122,000. The large standard deviation shown in Exhibit IV.26 reflects the wide range of change order experience among the surveyed projects.

Claims represented less than one-tenth of one percent of total project costs, with an average value per surveyed design-build project of $80,000 for claims. While there were few reported claims per design-build project, the average reported design-build project claim was $225,000. Claims affected less than 10 percent of the design-build projects reported.

Exhibit IV.26 lists the number and effect of change orders and claims on the costs of the subset of comparable design-build and design-bid-build projects surveyed during the study.

Exhibit IV.26 Change Order and Claim Activity for Similar Design-Build and Design-Bid-Build Projects

Design-Build Projects

Change Order Dimension	Change Orders Per Project	Change Order Costs Per Project ($000)	Cost Per Change Order ($000)	Claims Per Project	Claims Cost Per Project ($000)
Responses	16	16	16	18	17
Average	**16**	**$837**	**$85**	**0**	**$0**
Median	14	$467	$35	0	$0
Mode	17	$400	N/A	0	$0
Maximum	49	$3,355	$472	6	$0
Minimum	4	$14	$1	0	$0
Standard Deviation	**13**	**$890**	**$119**	**1**	**$0**

Design-Bid-Build Projects

Change Order Dimension	Change Orders Per Project	Change Order Costs Per Project ($000)	Cost Per Change Order ($000)	Claims Per Project	Claims Cost Per Project ($000)
Responses	14	14	13	18	18
Average	**22**	**$588**	**$47**	**0.6**	**$337**
Median	8	$275	$47	0	$0
Mode	5	N/A	$50	0	$0
Maximum	80	$4,000	$180	4	$6,000
Minimum	0	$0	$3	0	$0
Standard Deviation	**27**	**$1,013**	**$49**	1	**$1,413**

Source: similar D-B and D-B-B project surveys, Q16

As shown in Exhibit IV.26, the subset of design-build projects had fewer change orders than the comparable design-bid-build projects, but the average cost per change order was greater for the design-build projects. This could be attributed to the greater size of design-build projects. This can be confirmed by the fact that change orders represented about the same share of total project costs for both design-build and design-bid-build projects. In contrast, the dollar value of claims per project was significantly lower for design-build projects than for comparable design-bid-build projects, with the subset of design-build projects having no reported cost of claims.

The various levels of cost change (growth and decline) indicated in this section for design-build projects from the program and project surveys reflects the difficulty in isolating the cause of cost changes and the influence of project delivery approach on cost control. The effect of project delivery approach on project costs is difficult to determine due to the many other factors beyond the control of the contract team than can influence the final project cost. Since both design-build and design-bid-build projects experienced a wide range of cost changes during development, project costs appeared to be more influenced by factors independent of project delivery approach. Design-build project delivery appeared to reduce agency costs of contract administration and inspection relative to design-bid-build project delivery. Of particular note was the reduced level of claims and their related impacts on cost growth for the full survey sample of design-build projects reported, and especially for the subset of design-build projects when compared to similar design-bid-build projects.

EFFECT OF DESIGN-BUILD CONTRACTING ON PROJECT QUALITY

Contracting agencies are interested in obtaining a quality project, as well as one that is completed in a timely and cost-effective manner. Quality can be defined in a number of ways, depending on the point of view of the evaluator and the aspect of the project being considered. For many, project quality is defined as meeting all project specifications and their prescribed standards. As engineered projects, conformance with project specifications is determined by testing project materials and inspecting the end product relative to these standards. Project acceptance is based on the results of these tests and inspections.

Project quality can also be measured by determining if the contracting agency is satisfied with the product. Contracting agency satisfaction can have many dimensions, ranging from knowing the project meets all specifications (input-based measure of quality) to being pleased with the performance of product (outcome-based measure of quality). Performance-based specifications focus on the results or outcomes of the project and can be measured by various criteria, such as ride quality, durability, and visual aesthetics. These can be either quantitative or qualitative criteria and are subject to the expectations of thecontracting agency.

Prescribed (standards-based) specifications are the traditional way of determining project acceptance. However, with more responsibility being given to contractors for delivery of highway projects, the use of performance (outcome-based) specifications is increasing as a way to account for project quality dimensions not captured by standards and specifications and to promote greater innovation by contractors to achieve more cost-effective projects of equal of better quality.

In this section, project quality is discussed in terms of the following three criteria:

- Conformance with standards & specifications;
- Compliance with provisions of contract warranties; and
- Overall contracting agency satisfaction.

Estimated Impacts of Design-Build on Project Quality

The design-build project survey responses indicated that application of design-build project delivery had no differential impact on project quality in the opinion of the survey respondent. According to Exhibit IV.27, most (93 percent) of the design-build projects performed at the same level of quality as those delivered by the design-bid-build approach. Three percent of the surveyed projects note an increase in project quality while the same small percentage noted a decrease in project quality. Of the projects that experienced an increase in project quality, the average improvement was 8.5 percent, while the average decrease in project quality for projects that experienced a decline was 7.5 percent. These results are based on estimates provided by project survey respondents regarding changes in project quality by applying the design-build project delivery approach.

Exhibit IV.27 Estimated Change in Project Quality due to Design-Build Project Delivery

Quality Dimension	Value
Responses	61
Average	**0.0%**
Median	0.0%
Mode	0.0%
Maximum	10.0%
Minimum	-10.0%
Standard Deviation	**2.1%**

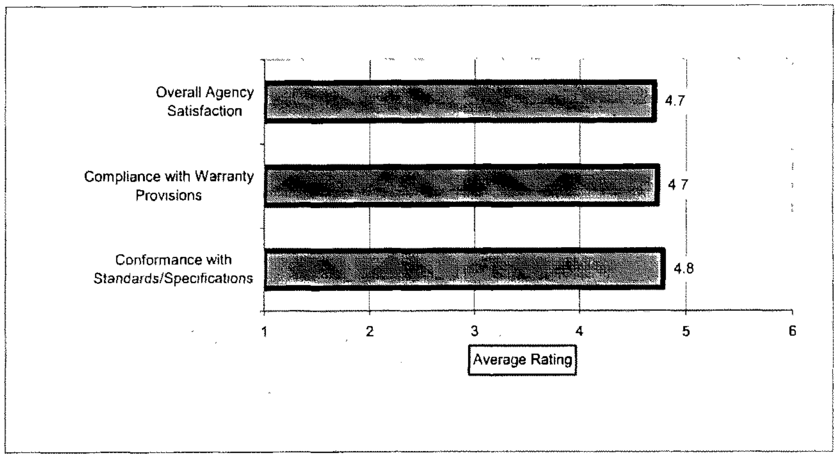
Source: D-B project survey: Q. 18

Contracting Agency Satisfaction

Contracting agency satisfaction with the outcome and process of project delivery is one of the primary ways to measure the quality of different approaches. According to project survey respondents, 97 percent of the design-build projects have fulfilled their intended purpose. Half of the respondents indicate that the method of project delivery has had a significant impact on the outcome of the project.

As shown in Exhibit IV.28, project survey respondents express a high level of satisfaction with design-build projects, averaging 4.7 on a six-point scale (in which 1 is poor and 6 is superior). The same high level of contracting agency satisfaction is noted in the compliance with warranties and standards & specifications.

Exhibit IV.28 Contracting Agency Satisfaction Ratings of Design-Build Projects (Scale: 1 – Poor; 6 – Superior)



Source: D-B project survey: Q17, 69 responses. Out of the 69 surveyed projects, 26 had warranty provisions.

Based on a detailed statistical analysis of project survey responses, the research team discovered that overall contracting agency satisfaction is highly correlated with the following project characteristics:

- Procurement method
- Type (complexity) of road project
- Size of project
- Percent of preliminary design completed prior to contract award

The results of this analysis are summarized in Exhibit IV.29. These results are statistically significant at the 95 percent confidence level.

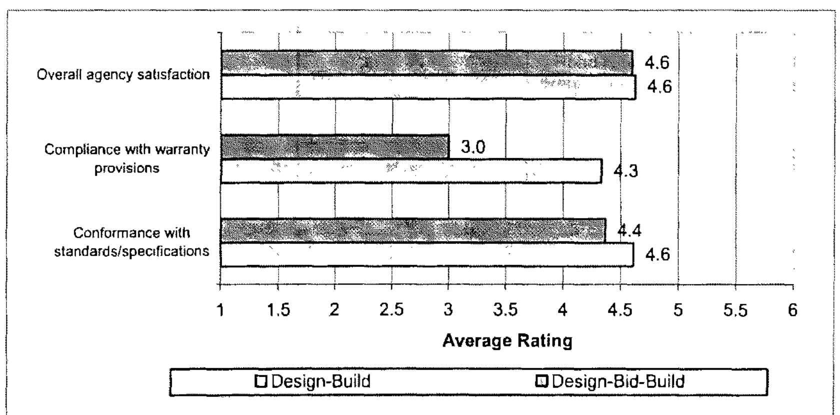
Exhibit IV.29 Overall Contracting Agency Satisfaction by Project and Contract Type

Project/Contract Characteristic	Overall Agency Satisfaction	
	Lower	**Higher**
Procurement Method	Low Bid	Best Value
Project Type	Road-Resurface/Renewal	Road-New/Widen and Rehabilitate/Reconstruct
Project Size	Smaller	Larger
% of Design Completed at Award	Higher	Lower

Source: D-B project survey: Q2, 4, 10, and 17, 69 responses

When a subset of 19 design-build projects is compared to similar design-bid-build projects, the survey results indicate that overall contracting agency satisfaction with design-build projects is on a par with design-bid-build projects, as shown in Exhibit IV.30. However, conformance with warranty provisions and standards and specifications are both rated higher for design-build projects than for similar design-bid-build projects.

Exhibit IV.30 Comparison of Contracting Agency Satisfaction Ratings between Similar Design-Build Projects and Design-Bid-Build Projects (Scale: 1 – Poor; 6 – Superior)



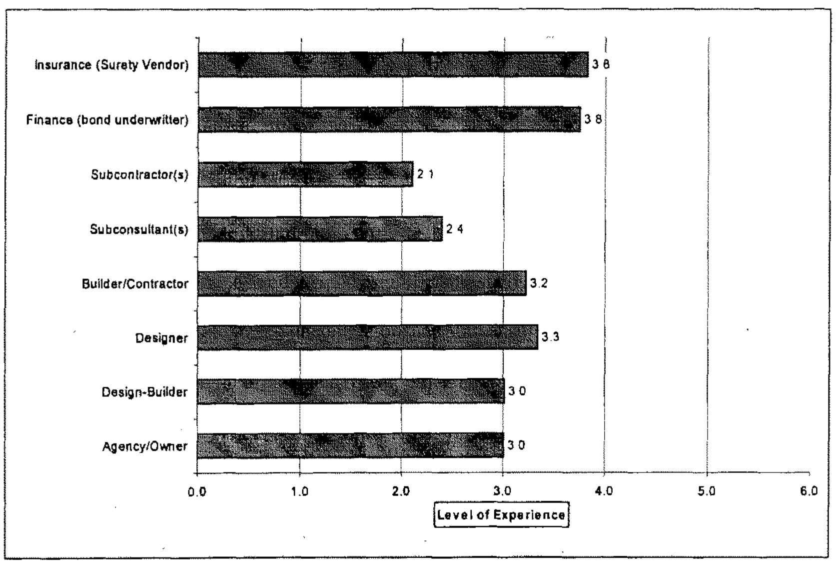
Source: similar D-B and D-B-B project surveys: Q17, 17 responses per survey type

Experience of the Project Delivery Team

Another measure of the quality of project delivery is the relative experience of members of the project team for the various functions comprising the project. Those teams with highly qualified and experienced members are likely to perform the best in delivering a quality project consistent with the terms of the contract. When asked to characterize the prior experience and expertise of key design-build project stakeholders, respondents to the design-build project surveys provided the responses listed in Exhibit IV.31.

As shown in Exhibit IV.31, design-build project survey respondents perceived that insurance and finance officials were the most experienced parties, with a 3.8 rating on a six-point scale (in which 1 equals no experience and 6 equals significant experience). Designers, builders/contractors, design-builders, and agency-sponsors were next most experienced, with ratings ranging from 3.0 to 3.3. Subcontractors and subconsultants were rated the least experienced, with ratings of 2.1 and 2.4 respectively. These modest ratings reflected the relative newness of the design-build project delivery approach to the domestic highway industry.

Exhibit IV.31 Perceived Experience among Stakeholder Groups for Design-Build Projects (Scale: 1 – None; 6 – Significant Experience)

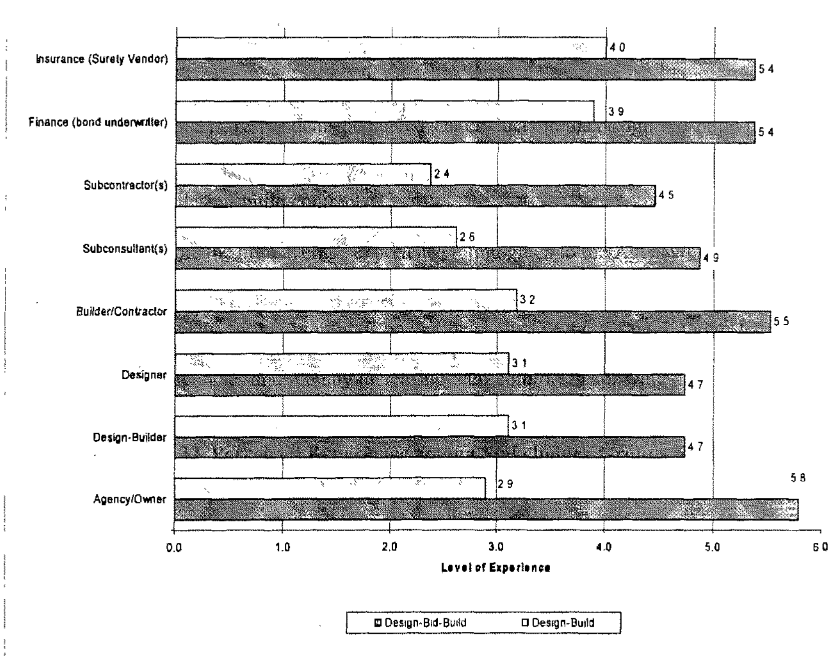


Source: D-B project surveys: Q17, 69 responses

When responses to the subset of design-build project surveys were compared to those for similar design-bid-build projects, respondents perceived stakeholders in the design-bid-build process had a much greater level of expertise and familiarity. These results, shown in Exhibit IV.32, are consistent with the prevalence of design-bid-build contracting by transportation agencies and the relative newness of design-build contracts.

It is interesting to note the high average experience rating given to the Agency/Owner category for design-bid-build projects (5.8) and the much lower experience rating given to this same category for design-build projects by the survey respondents (who themselves are part of this stakeholder group). This further highlights one of the challenges facing those interested in pursuing design-build project delivery—raising the expertise and experience in this approach among contracting agencies and thereby increasing their comfort in applying design-build at a more significant level.

Exhibit IV.32 Perceived Experience among Stakeholder Groups for Similar Design-Build and Design-Bid-Build Projects



Source: similar D-B and D-B-B project surveys: Q17, 17 responses per survey type

Other Project Delivery Success Criteria

Survey respondents report a number of factors they use to measure project delivery success. Chief among them is meeting the objective quality standards of the contracting agency, plus project completion on time and under budget. These and other project delivery success criteria are outlined in Exhibit IV.33. Each of these factors relates in some way to the issues of concern posed by Congress in requesting this study.

Exhibit IV.33 Project Delivery Success Criteria Used by Project Survey Respondents

Quality
• Project quality relative to comparable design-bid-build projects • Number of claims or change orders • Achievement of project scope and objectives, including project quality standards, traffic impacts, and environmental goals
Cost
• Total project cost relative to budget • Amount of cost overrun • Cost of claims or change orders
Timeliness
• Project opening relative to scheduled completion date • Length of project extension • Project advancement or velocity relative to schedule
Other
• Dollar amount of incentive payment to contractor relative to maximum possible incentive payment • Ability to control cost and schedule to issue toll road revenue bonds at minimum risk • Success of implementing new technology or construction techniques • Experience of contractor with design-build projects or other projects similar in scope to the design-build project • Project likelihood without use of design-build or other approaches to advance project • Implementation of extended warranty or other risk mitigation approaches

Source: D-B project survey: Q17, 48 responses

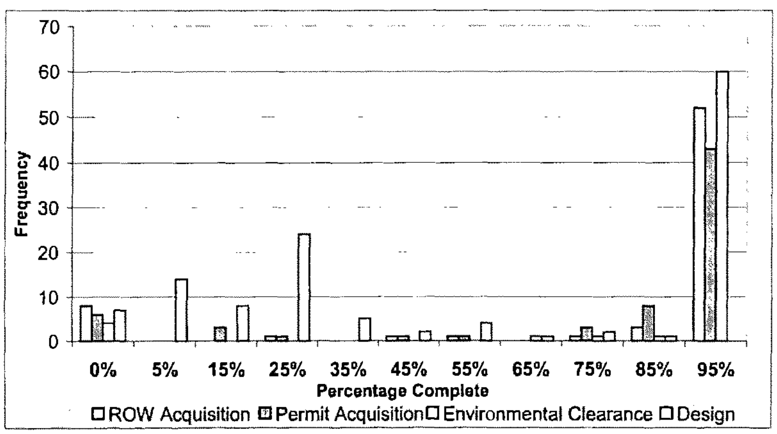
APPROPRIATE LEVEL OF PRELIMINARY DESIGN FOR DESIGN-BUILD PROCUREMENTS

Having chosen design-build contracting to deliver a particular project, contracting agencies must decide at which point in the project development life cycle to initiate the design-build contract. This decision is influenced by the nature and complexity of the project, the needs of prospective design-build teams to understand the full requirements and potential risks of the proposed project before developing and offering a design-build contract proposal, the comfort level that contracting agencies have in letting design-builders develop the scope of the project based on the project's defined performance objectives, and what has become accepted practice based on other, earlier design-build projects.

An earlier survey of six STAs using design-build found a broad range for the level of preliminary design completed before issuing requests for bids of proposals for design-build projects.[1] The range was 15 percent to 50 percent, with the average among the six agencies being 31 percent (Colorado and Washington, respectively). The higher the percentage preliminary design completed before design-build procurement the more likely the selection process was based on low bid (New Jersey and Indiana). The lower the percentage preliminary design completed the more likely the selection process was based on a composite score or best-value (South Carolina and Arizona).

Based on the completed design-build project surveys, Exhibit IV.34 shows the distribution of the percentage completion of preliminary design relative to other pre-construction activities such as right-of-way acquisition, permit acquisition, and environmental review.

Exhibit IV.34 Percent Completion of Selected Functions at Design-Build Project Award



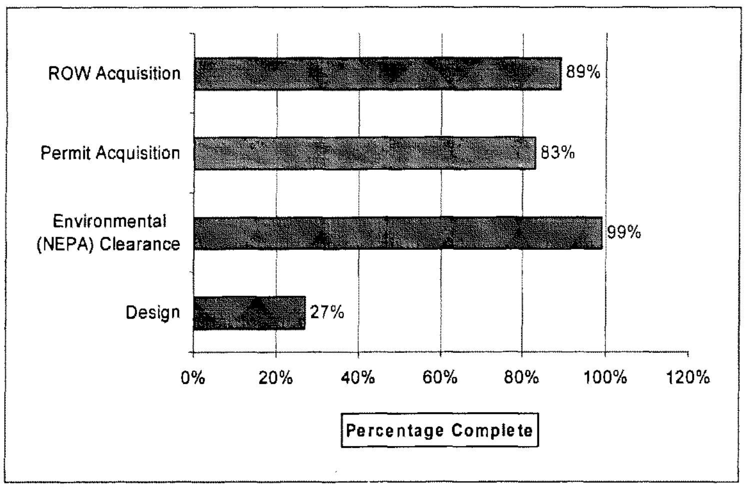
Source: D-B project surveys: Q10, 69 responses

[1] Molenaar, Keith R. and Douglas D. Gransberg, *Design-Builder Selection for Small Highway Projects*, ASCE Journal of Management in Engineering, Vol. 17, No. 4, October 2001

A high proportion of right-of-way acquisition, permit acquisition, and environmental review functions are completed by design-build contract award, while most preliminary designs are below 30 percent complete by design-build award. Notice that several projects had the design-builder responsible for all of these functions (the projects with functions at 0 percent completion by design-build award, to the far left of the chart).

On average, as shown in Exhibit IV.35, right-of-way acquisition was 89 percent complete for surveyed design-build projects, permit acquisition was 83 percent complete, and environmental clearance[2] was 99 percent complete.

Exhibit IV.35 Average Percent Completion of Selected Functions at Design-Build Project Award



Source: D-B project surveys: Q10, 69 responses

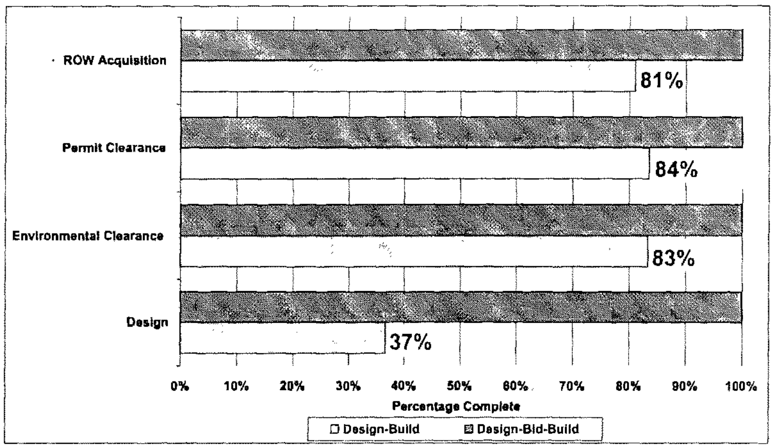
Permit acquisition may include Section 404, navigable waterways, water quality, air quality, noise levels, and other local permits. NEPA clearance may include an environmental assessment or preparation of a full environmental impact statement. Most of the surveyed design-build projects had completed 100 percent of right-of-way acquisition and permit and environmental clearance prior to project award. On average, design was 27 percent complete prior to design-build contract award. For 81 percent of the reported projects, the percentage of design completion by design-build contract award was 30 percent or less.

When a subset of design-build projects is compared to similar design-bid-build projects, survey results reveal that design-build projects had somewhat less right-of-way acquisition and permit and environmental clearance complete by contract award, as shown in Exhibit IV.36. All

[2] Under the National Environmental Policy Act (NEPA) or similar state legislation

comparable design-bid-build projects had completed 100 percent of preliminary project activities. For the subset of design-build projects surveyed, the average percent design completion prior to going to a design-build contract was 37 percent, with 78 percent of the projects at 30 percent or less.

Exhibit IV.36 Average Percent Completion of Selected Functions at Project Award for Similar Design-Build and Design-Bid-Build Projects



Source: similar D-B and D-B-B project surveys: Q10, 17 responses per survey type

These results are consistent with the finding in Exhibit IV.29 that the level of contracting agency satisfaction reported for design-build projects was higher for lower levels of preliminary design completed before design-build contract award. This could be attributed to a design-builder's ability to influence the project design earlier in the process to promote its constructability and cost-effectiveness. While each project should be considered on an individual basis, the results suggest that no more than 30 percent of preliminary design be completed before design-build contract award, with lower percentages as the contracting agency gains more experience with design-build contracting and greater reliance is placed on performance-based specifications.

IMPACT OF DESIGN-BUILD CONTRACTING ON SMALL BUSINESSES

The advent of design-build project delivery has raised concerns by some that small firms[3] may be unable to participate on design-build teams, particularly as the design-build team lead or

[3] Small business is defined as any organization with less than 500 employees and \$6 million in average annual receipts for service organizations (\$28.5 million for general building and heavy construction contractors and \$12 million for special trade construction contractors) For applicable small business size standards by industry category, see the U.S. Small Business Administration's Small Business Size Regulations, 13 CFR §121 or the Table of Small Business Size Standards.

prime contractor, due to the increased functional scope and scale of many design-build contracts, more stringent qualification requirements, and/or higher bonding requirements. In some cases, contracting agencies have applied design-build to smaller projects to address this and other issues. In the context of this report, small business participation includes the involvement of smaller firms in design-build projects as a prime contractor, joint venture partner, or subcontractor.

Agency respondents to the design-build program survey indicated that the percentage of design-build project costs going to small businesses was about the same on average as design-bid-build projects, with only a very small reduction indicated for design-build projects. This is shown in Exhibit IV.37, in which small business involvement with design-build projects is estimated to be within 2 percent of the level of involvement with design-bid-build projects overall, and within 1 percent of that for design-bid-build projects when the design-build team is based locally. These results suggest that small businesses are not disadvantaged when projects are developed through the design-build process, according to agency design-build program managers.

Exhibit IV.37 Small Business Involvement on Similar Design-Build and Design-Bid-Build Projects

Competitive Dimension	Design-Build			Design-Bid-Build		
	Average	Maximum	Miniumum	Average	Maximum	Miniumum
Percent of Project Costs Provided by Small Firms	**31.3%**	55.0%	5.0%	**33.0%**	55.0%	15.0%
Percent of Project Costs Provided by Small Firms on Local Competing Teams	**32.3%**	75.0%	5 0%	**32.9%**	75.0%	15 0%

Source: D-B program survey: Q15, 15 to 22 responses

Size of Prime Contractors and Subcontractors for Design-Build Versus Design-Bid-Build Projects

Two-thirds of agency design-build program respondents indicated that on average, the prime contractors and subcontractors for design-build projects are similar in size to their counterparts on design-bid-build projects. The remaining one-third indicated that prime contractors for design-build projects were significantly larger than their counterparts for design-bid-build projects (5.4 on a 6-point scale with 1 being smaller and 6 being larger), while subcontractors for design-build projects were only marginally larger in size than their counterparts for design-bid-build projects (3.4 on the same 6-point scale).

While the size of prime contractor firms may have been somewhat larger for design-build projects than for design-bid-build projects (though not always so), the size of subcontractor firms was essentially the same. To the extent small businesses are currently involved in the design and construction of design-bid-build projects, similar opportunity appears to exist for design-build

projects, particularly in the role of subcontractor. These results suggest small businesses are playing a comparable role for design-build projects as for design-bid-build projects, and that the design-build project delivery process is not preventing small businesses from participating in design-build projects to a comparable degree.

Limits on the Extent of Design-Build Contract Value Held by the Prime Contractor

The opportunity for small businesses to participate in design-build projects is also affected by the amount of the contract retained by the prime contractor. Where maximum limits are defined, the contracting agency determines the extent to which firms other than the prime contractor must be involved in the project. Where minimum limits are defined, the contracting agency determines the limits to which firms other than the prime contractor can be involved in the project. The larger the contract value and the higher the percentage of contract value required to be retained by the prime contractor both suggest fewer opportunities for involvement by small businesses that are less likely to have the resources or background to warrant serving as the prime contractor.

On a program-wide basis, 81 percent of the respondents indicate there are maximum limits and/or minimum limits on prime contractor involvement specified in design-build contract language. Where maximum limits existed, the maximum percentage ranged from 70 percent to 100 percent. Where minimum limits existed, the minimum percentage ranged from 30 percent to 51 percent. FHWA eliminated the 30 percent self-performance requirements for traditional contracts when it developed the Design-Build Contracting Regulations[4].

Use of Direct Hire Versus Subcontractor Resources for Design-Build Contracts

The project survey results indicate that for design-build projects, an average of 60 percent of design work was subcontracted, with the remaining 40 percent handled as direct hire (self-performance by the design-builder or its core team members). As shown in Exhibit IV.38, an average of 75 percent of construction work was directly hired and 25 percent was subcontracted.

Exhibit IV.38 Proportion of Direct Hire and Subcontracted Work by Function for Design-Build Projects

Analysis Dimension	Direct Hire Design	Subcontracted Design	Direct Hire Construction	Subcontracted Construction
Responses	48	48	48	48
Average	**40%**	**60%**	**75%**	**25%**
Median	4%	96%	85%	16%
Mode	0%	100%	100%	0%
Maximum	100%	100%	100%	100%
Minimum	0%	0%	0%	0%
Standard Deviation	**45%**	**45%**	**32%**	**32%**

Source: D-B project survey: Q13

[4] 23 CFR §635.116(d)(1)

Based on the smaller sample of similar design-build and design-bid-build projects shown below in Exhibit IV.39, the project survey indicates that design-bid projects had a much higher percentage of subcontracted design work than similar design-bid-build projects, averaging 52 percent for design-build projects versus only 11 percent for design-bid-build projects. In contrast, the proportion of subcontracted construction work was about the same for design-build as for design-bid-build projects, at 21 percent to 24 percent, respectively. This may be due to the predominant role of construction contractors on many design-build teams, who may be more willing to subcontract design work than construction work. This may also be due to the larger size and complexity of many design-build projects, which require more sophisticated designs.

Exhibit IV.39 Proportion of Direct Hire and Subcontracted Work by Function for Similar Design-Build and Design-Bid-Build Projects

Design-Build Projects

Analysis Dimension	Direct Hire Design	Subcontracted Design	Direct Hire Construction	Subcontracted Construction
Responses	11	11	11	11
Average	**48%**	**52%**	**79%**	**21%**
Median	70%	30%	80%	20%
Mode	0%	100%	100%	0%
Maximum	100%	100%	100%	45%
Minimum	0%	0%	55%	0%
Standard Deviation	**47%**	**47%**	**17%**	**17%**

Design-Bid-Build Projects

Analysis Dimension	Direct Hire Design	Subcontracted Design	Direct Hire Construction	Subcontracted Construction
Responses	5	5	11	11
Average	**89%**	**11%**	**76%**	**24%**
Median	89%	11%	70%	30%
Mode	89%	11%	100%	0%
Maximum	100%	20%	100%	42%
Minimum	80%	0%	58%	0%
Standard Deviation	**7%**	**7%**	**16%**	**16%**

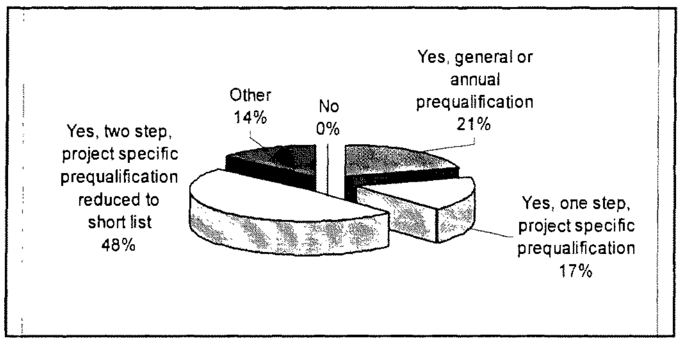
Source: similar D-B and D-B-B project surveys: Q13. A smaller number of D-B-B project surveys reported a breakdown in design work between direct hire and subcontract resources.

These results suggest that design-build contracts may spread more of the design work among subconsultants than comparable design-bid-build contracts, which should be a positive feature for small business enterprises.

Prequalification Requirements

Another factor impacting the extent of competition for design-build projects is the extent to which proposers must be prequalified, which means having satisfied certain performance or capability criteria to be able to bid on design-build project contracts. All respondents to the design-build program survey indicated they require some form of prequalification, as noted in Exhibit IV.40. About half the respondents used a two-step project-specific process, whereby the initial step used prequalification information to select a short list of prospective proposers for design-build projects. The rest used either a one-step project-specific prequalification or a more general or annual prequalification to define eligible prospective proposers.

Exhibit IV.40 Prequalification Requirements for Design-Build Projects



Source: D-B program survey; Q3, 29 responses

Extent of Competition for Design-Build Projects Versus Design-Bid-Build Projects

As reported in the design-build program surveys, the extent of competition for design-build projects is perceived to be significantly lower than that reported for design-bid-build projects. As shown in Exhibit IV.41, almost 40-percent fewer teams responded to requests for qualifications (RFQs) for design-build projects than to requests for pre-qualifications for design-bid-build projects; however, it is recognized that many states use an RFQ process for the design phase and an annual program-wide prequalification process for the construction phase of a design-bid-build project. One-third fewer teams responded to requests for proposals (RFPs) for design-build projects than to invitations for bids (IFB) for design-bid-build projects. Similarly, there were 40-percent fewer local design-build teams than local design-bid-build teams that responded per project opportunity. The design-build program survey also revealed that the

proportion of design-build teams led by local firms was estimated by respondents to be 81 percent, versus 91 percent for design-bid-build teams.

The ability to offer stipends to unsuccessful proposers of design-build projects recognizes the relatively high cost of preparing a design-build proposal when compared to a design proposal or construction bid. By offering a stipend to pre-qualified proposers, contracting agencies also seek to increase the number of capable proposers and thereby enhance competition for these types of procurements. The program survey indicated that just over half of the design-build program respondents paid stipends to unsuccessful teams proposing on a design-build project, with the average approximately $50,000 per team.

Exhibit IV.41 Level and Type of Competition for Similar Design-Build And Design-Bid-Build Projects

Competitive Dimension	Design-Build			Competitive Dimension	Design-Bid-Build		
	Ave	Max	Min		Ave	Max	Min
Average Number of Teams Responding to Request for Qualifications (RFQ) per Project	6	15	3	Average Number of Teams Responding to Prequalification per Project	10	40	0
Average Number of Teams Responding to Request for Proposals (RFP) per Project	4	6	2	Average Number of Teams Responding to Invitation for Bid (IFB) per Project	6	12	0
Average Number of Local Teams (Led by Local Firms) per Project	3	5	1	Average Number of Local Teams (Led by Local Firms) per Project	5	10	2
Average Amount of Stipends Paid per Team per Project ($000s)	$48.8	$250 0	$0.0	Average Amount of Stipends Paid per Team per Project ($000s)	$0.0	$0.0	$0 0

Source: D-B program survey: Q15, 24 responses

These results indicate that the number of firms or teams responding to a design-build project was estimated to be smaller than that for design-bid-build projects, particularly at the local level. This may reflect the newness and perceived risks (including the higher costs of proposal preparation) associated with this particular project delivery approach to the Federal-aid highway program and the traditional design and construction firms that have served this program over the years. It may also result from the two-step selection process frequently used for design-build projects whereby only qualified firms are short-listed by the agency. This "short-listing" process limits the level of competition for these projects to avoid having too many firms commit the large level of resources typically needed to generate a design-build proposal. It also limits the financial exposure of the contracting agency if a stipend is offered to all unsuccessful proposers. This is not considered a detriment to the design-build procurement process since competition among qualified firms is retained.

The larger scale and scope of a typical design-build project, the more extensive use of short-listing to procure design-build services, and the newness of this project delivery method makes it impossible to compare the number of proposing teams for a design-build project and a similar

design-bid-build project. Of note is the relatively high proportion of local teams reported to be proposing on design-build projects by agency program managers, which would tend to refute claims that design-build project delivery heavily favors national firms over local firms.

ASSESSMENT OF SUBJECTIVITY USED IN DESIGN-BUILD CONTRACTING

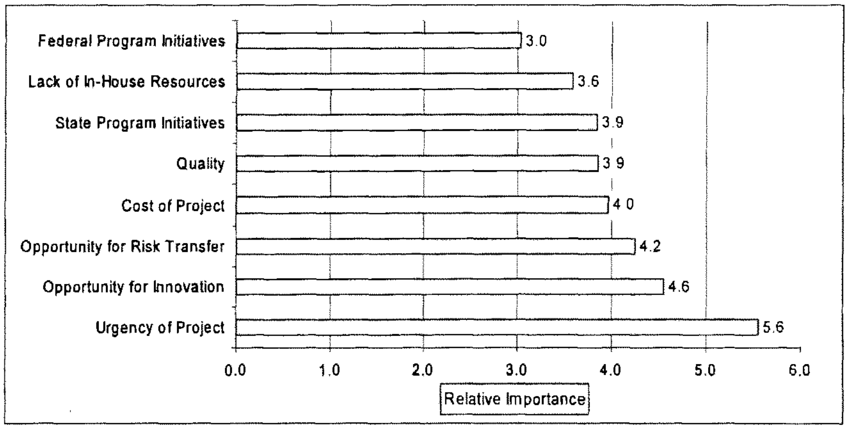
The advent of design-build project delivery has also raised questions regarding the extent of subjectivity used in selecting a design-build contractor team and the effect this can have on project cost-effectiveness and the equity of the procurement process. The primary issues involve the use of non-cost factors in determining the successful bidder for a design-build project and the perceived objectivity of the selection criteria and process used. This is of particular concern when design-build contracts are assigned on the basis of expected best-value to the contracting agency, versus the more traditional low-bid selection process.

To properly address this issue, it is important to understand what factors prompt contracting agencies to use design-build in the first place and to what extent cost is an important factor in their considerations. These and other factors that affect the extent of competition for design-build contracts are explored in this section from both program-level and project-level perspectives.

Design-Build Project Designation Criteria

On a program-wide basis, there are a number of factors that affect the decision of whether or not to use design-build. Exhibit IV.42 shows the relative rankings in descending order of eight factors (using a 6-point scale where 0 is unimportant and 6 is extremely important). According to the design-build program survey responses, the most important factor was viewed as the urgency of the project.

Exhibit IV.42 Relative Importance of Factors Considered in Deciding Whether to Use Design-Build (Scale: 1 – Unimportant; 6 – Extremely Important)



Source: D-B program survey: Q1, 29 responses

Among the design-build program survey respondents, 97 percent considered project urgency of great importance to making this decision. The next most important factor was opportunity for innovation, followed by opportunity for risk transfer. The other five factors, headed by project cost and quality, were not viewed as important as project urgency in deciding whether to use the design-build approach.

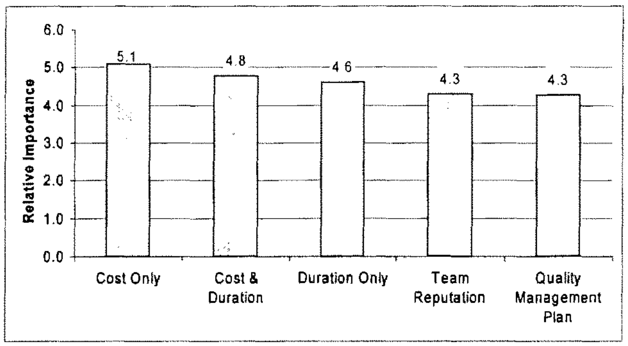
Respondents rated federal initiatives that encourage agencies to consider design-build project delivery, even on an experimental basis such as SEP-14, as having the least influence on their decisions regarding the application of this project delivery approach to particular projects among the factors noted above. Other factors considered important by individual respondents but not included in the average ratings shown above included project size, project type, and funding availability.

These results suggest that for early users of design-build in the Federal-aid highway program, the potential for faster project delivery and the application of innovative approaches served as the primary motivators for their decision to use design-build project delivery for projects. The importance of project delivery speed reinforces the earlier findings in this chapter that show that design-build offered the greatest potential for reducing project duration than for improving any other key project performance criteria.

Design-Build Contract Award Criteria

For those projects designated for design-build delivery, respondents to the design-build program survey perceived cost as the most important factor in awarding project contracts even though project duration was the most important factor in deciding whether to use the design-build approach. As shown in Exhibit IV.43, cost and cost combined with duration were perceived to be the most important factors in awarding design-build project contracts by the design-build program managers from responding agencies.

Exhibit IV.43 Key Factors Considered in Awarding Design-Build Project Contracts (Scale: 1 – Unimportant; 6 – Extremely Important)

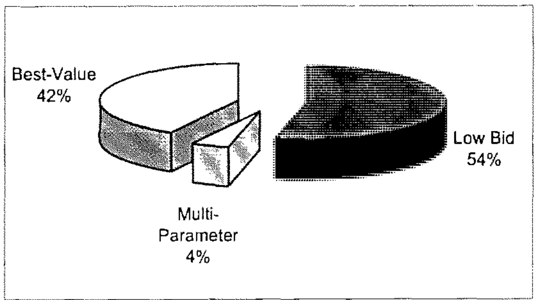


Source: D-B program survey: Q2, 29 responses.

Overall, cost represented just over half of the weighting (55 percent) when factors other than cost were included in the proposal evaluation. In several cases, respondents noted that their traditional project award process and criteria had not changed for design-build projects—namely low bid-based project award (cost only—100 percent weighting). Other approaches used included adjusted scoring based on the weighting of factors unique to the project and technical merit.

These results are reflective of the design-build project survey responses, where just over half of the design-build projects were procured on the basis on low-bid, versus 42 percent using best-value and 4 percent using multi-parameter approaches. This is illustrated in Exhibit IV.44.

Exhibit IV.44 Procurement Approach of Design-Build Projects

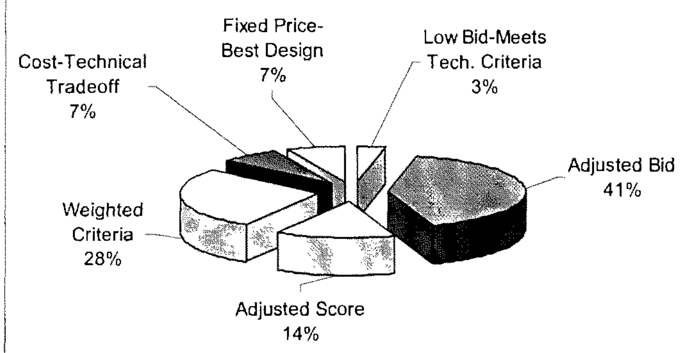


Source: D-B project survey: Q4, 29 responses

Among the design-build projects procured based on best-value, a diversity of evaluation approaches was used, as illustrated in Exhibit IV.45 (see Appendix A - Glossary of Terms for definitions of each best value method). Forty-one percent of the reported projects were awarded based on an adjusted bid and 14 percent were awarded based on an adjusted score for a combined total of 55 percent. These two best value evaluation methods are quite similar (they are the mathematical reciprocal of each other) and both weigh price at 50 percent. Weighted criteria represent 28 percent of the best-value procurements. Cost-technical tradeoff, fixed price/best design, and low bid meeting technical criteria round out the remaining approaches.

These results suggest that while project urgency and innovation were the primary motivators for using design-build contracting, cost remains the primary factor for awarding design-build contracts, even when other factors such as duration, team reputation, and quality were included in the deliberations. In addition, low bid continued to play an important role in contract award decisions, with best-value approaches using multiple criteria including cost gaining momentum.

Exhibit IV.45 Best Value Procurement Evaluation Methods for Design-Build Projects



Source: D-B program survey: Q4, 29 responses

Since design-build includes a significant design element, it is important to include these other factors as is the case for the procurement of engineering service contracts (which must use qualifications-based selection procedures). Best value selection provides for the consideration of both cost and other more subjective factors such project management, quality control, and team reputation.

Given the results of this review of contracting approaches and features of design-build versus design-bid-build projects, it is apparent there remain significant controls in place to limit the extent of subjectivity in awarding design-build contracts and to preserve reasonable access for prospective contractors of all types and sizes to projects using this contracting approach.

OTHER DESIGN-BUILD CONTRACT FEATURES

There are a number of additional features of design-build contracts that can impact the relative risk to the public and private sector participants in the contract and the opportunity to apply more cost-effective approaches to accomplishing the objectives of the project. These include:

- Methods of pricing the major elements of the contract;
- Use of prescriptive versus performance-based specifications;
- Provision of monetary and other incentives for superior performance or early completion and disincentives for inadequate performance or late completion; and

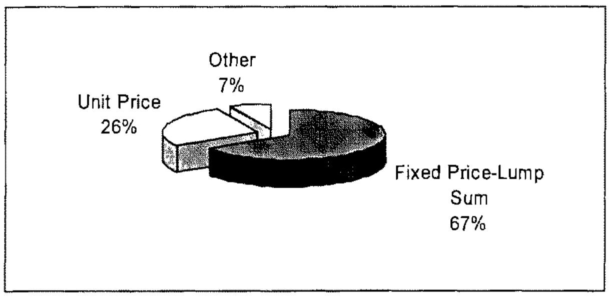
- Inclusion of warranties linked to facility condition over a specified period of time or cumulative volume of traffic.

Each of these features is discussed below as they relate to the SEP-14 design-build projects surveyed in this study.

Design-Build Contract Pricing Approaches

The majority of the value of reported design-build projects used fixed price-lump sum pricing, as shown in Exhibit IV.46. This is in contrast to design-bid-build contracts that typically use unit pricing. One-quarter of the value of the reported design-build projects involved the use of unit pricing. As noted earlier, the smaller portion of design-build project costs falling under unit pricing or other approaches was primarily due to the use of a combination of payment methods, whereby certain breakout items were quoted on a unit price basis, while the majority of items were included in the fixed price-lump sum.

Exhibit IV.46 Contract Pricing Methods for Design-Build Projects



Source: D-B project survey: Q6, 69 responses

The use of fixed price-lump sum pricing by design-build contracts is a distinguishing feature that reflects greater project risks transferred to a design-build contract team. This form of contract pricing allows for progress billing and payment instead of detailed quantity measurement and verification. This simplifies and reduces the field administrative effort associated with contract billing and payment for the contracting agency and design-builder. Lump sum contract pricing can also be linked to performance standards, which can be used to trigger payments for work/service delivered. Lump sum pricing focuses attention on the project schedule and encourages the design-builder to stay within project scope, avoid change or extra work orders that are a major cause of project cost creep, and complete the project within the allotted timeframe.

Design-Build Contract Specifications

One of the purported advantages of design-build project delivery is the opportunity to use more performance-based specifications to encourage greater innovation by the design-build team and

focus on project performance results versus conformance with product specifications that may be outdated given the latest technology and research. Some are concerned that the substitution of performance-based specifications may confer unfair advantage to those contract teams with access to proprietary technology that may satisfy performance standards more cost-effectively than their competitors.

Based on the results of the design-build project survey, the specifications used for over half of the reported design-build projects were reported to be entirely prescriptive. The remaining projects were reported to involve some combination of prescriptive and performance-based specifications. Only 3 percent of the responses were reported to use only performance-based specifications in their contract. About 10 percent of the projects had a 50/50 mix of performance and prescriptive specifications. When combined, the sample of design-build projects reflected a 73 percent use of prescriptive-based specifications and only a 20 percent use of performance-based specifications, as shown in Exhibit IV.47.

Exhibit IV.47 Average Relative Use of Prescriptive and Performance Specifications for Design-Build and Design-Bid-Build Projects

Survey Source	Sample Size	Prescriptive Specifications	Performance Specifications
D-B Survey Sample	69	73%	20%
D-B Project Subset	17	58%	34%
D-B-B Similar Projects	17	59%	33%

Source: D-B project survey and similar D-B and D-B-B project surveys: Q11

In comparing a more limited sample of design-build projects to similar design-bid-build projects, the average relative use of prescriptive and performance specifications was similar for both project delivery methods. As shown in Exhibit IV.47, prescriptive specifications were used for nearly 60 percent of design-build and design-bid-build projects, while performance specifications were used for approximately 33 percent of design-build and design-bid-build projects in the sample. These results demonstrate the growing use of performance-based specifications for highway project contracts for both project delivery approaches.

Design-Build Contract Incentives and Disincentives

The use of incentives and disincentives in project contracts is intended to promote certain desirable project delivery results (such as early completion) and minimize undesirable consequences (such as unexcused completion delay or failure to meet specifications). Project incentives are becoming more popular for reconstruction and rehabilitation of existing roads to promote early project completion and thereby reduce inconvenience to motorists using the facility. Liquidated damage and disincentive provisions are frequently included in construction contracts to recover the contracting agency's construction engineering costs and road user costs resulting from contractor delays.

When questioned about the use of incentives and disincentives on completed design-build projects, 20 percent of the respondents to the project survey indicated the use of specific incentive clauses while 46 percent indicated the use of specific disincentive clauses. The various kinds of incentives noted in the design-build project survey responses are listed in Exhibit IV.48.

Exhibit IV.48 Design-Build Contract Incentive Types

<table>
<tr><td>Early Completion Incentive
• Flat incentive for early completion
• Daily incentive for early completion
• Completion of specified elements such as roadway lighting and bridges</td><td>Project Quality
• Pavement smoothness or ride quality
• Materials quality
• Workmanship quality</td></tr>
<tr><td>Traffic Management
• Auxiliary lane availability
• Travel time</td><td rowspan="2">Other Incentives
• Award fee for management, quality, and schedule
• Project safety
• Public relations program</td></tr>
<tr><td>Revenue Sharing
• 70 percent of net toll revenue from early traffic</td></tr>
</table>

Source: D-B project survey: Q7, 69 responses

Most frequently mentioned incentives were for early completion of the project or a specified element of a project, or for project quality including pavement smoothness. Other incentives were offered for traffic management, public information, project safety, and toll revenue sharing for early opening.

The various kinds of disincentives noted in the design-build project survey responses are listed in Exhibit IV.49. Disincentives included late completion penalties and stipulated damages as well as lane rental fees for the closure of traffic lanes and shoulders. The same relative usage and types of incentives and disincentives were found among the seven pairs of comparable design-build and design-bid-build projects. This suggests that the issue of incentive and disincentive use is more a function of evolving industry practice rather than project delivery approach.

Exhibit IV.49 Design-Build Contract Disincentive Types

<table>
<tr><td>Late Completion Penalties
• Project schedule overruns
• Escalated damages for extended delay
• Failure to meet given materials and roadway smoothness standards</td><td>Stipulated Damages
• Delay in substantial completion
• Delay in final acceptance</td></tr>
<tr><td colspan="2">Other Disincentives
• Limited eligibility for time extensions
• Lane rental fees for closing existing traffic lane and/or shoulder</td></tr>
</table>

Source: D-B project survey: Q7, 69 responses

Extended Warranties in Design-Build Contracts

Thirty percent of the surveyed design-build projects included extended warranties[5]. Of those design-build projects with warranties, two-thirds were material and workmanship warranties and one-third were performance or condition warranties. The duration of design-build project warranties ranged from six months to ten years. One ITS project included a two-year warranty for computer software. Most warranties were one, five, or seven years in duration, with the average duration of just over four years

Most reported design-build project warranties included clauses that defined conditions that complete or void the warranty. These were typically defined in terms of time limits. Several projects had other "escape" clause criteria, including the impact of a natural disaster on the project or other factors beyond the contractor's control. Pavement warranties usually have an axle loading limit on the warranty to account for the impacts of vehicle use on pavement deterioration. However, none of the survey respondents indicated the use of an axle loading exclusion clause in their pavement warranty clauses.

In general, the inclusion of an extended warranty is not considered a competitive factor in the selection of design-build projects by the respondents. In addition, extended warranties are reported to have little or no impact on the quality, timeliness, and cost of design-build projects. Like incentives and disincentives, the use of extended warranties appears to be more a function of project type than project delivery approach. As a form of risk transfer to the project contracting team, they have been used for projects involving all kinds of project delivery approaches, not just design-build. This may reflect the fact that design-build contracts are used more for project expediency and innovation than to ensure the longevity of project performance.

Certainly extended warranties can be a distinguishing feature in promoting competitive products to consumers, as the automobile manufacturers have discovered. However, in the case of highway projects, the traditional separation of project development and preservation phases (operations and maintenance), both temporally and organizationally within agencies, likely diminishes the perceived value of extended warranties for those units responsible only for project development.

* * * * * *

Chapter V presents the conclusions and recommendations of the study, based on the findings presented in this chapter.

[5] Based on D-B project survey: Q8, 69 responses

V. CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the lessons learned by survey respondents and changes planned for their agencies' design-build programs. The chapter also presents the conclusions of the research team regarding the prospective use of design-build project delivery and the team's recommendations for improving the use of design-build contracting in the nation's highway development program.

AGENCY SUGGESTIONS FOR IMPROVING DESIGN-BUILD PROGRAMS

In responding to the study surveys, the design-build project managers shared their thoughts regarding lessons learned during the SEP-14 program. The research team also received numerous comments and suggestions regarding changes the surveyed agencies have made in their design-build programs and suggestions to further improve these programs, based in part on these lessons learned. This section summarizes the comments and suggestions for improvement.

Design-Build Program Lessons Learned Based on Project Surveys

The project managers who completed design-build project surveys noted many lessons learned from these projects. Key lessons included:

- Carefully choosing projects appropriate for design-build
- Adequately preparing to procure and manage a design-build project;
- Properly phasing the project by timing permitting, environmental clearance, and right-of-way acquisition prior to award of design-build contract;
- Leaving design guidelines "loose," with performance criteria designed to drive the creativity of the design-build team; and
- Maintaining communications between the contracting agency and design-build team.

The full digest of "lessons learned" comments is provided in Exhibit V.1.

Design-Build Program Improvements Based on Program Surveys

Design-build project managers responding to the surveys reported having undertaken or proposed several major changes to improve the effectiveness of their agencies' design-build programs. Changes included amending quality assurance and quality control, better defining program guidelines, and working more closely with design and construction contractors to craft a better program. Several agencies reported that their design-build program was reassessed on an ongoing basis as projects moved through the process. Florida DOT's response was typical:

> "Design-build is a continually evolving concept in which we incorporate changes and make improvements with the completion of every job."

Actual changes that have already been undertaken as reported in the program surveys are summarized in Exhibit V.2, and those that are proposed are summarized in Exhibit V.3.

Exhibit V.1 Summary of Lessons Learned from Design-Build Projects

Guidelines	Cooperation with Industry
• Performance criteria in lieu of prescribed specifications is key to efficiency of the design-build process • Project criteria should state project goals	• Process works best with experienced contractors and designers • Contracting community requires education on conceptual estimating practices, especially the subcontracting community
Project Selection	**Project Phasing**
• It is relatively simple to use design-build to replace existing similar construction • May not be well-suited for small projects such as small bridges • May be better suited for roadway construction rather than ITS projects • Ideal method for road widening under traffic	• Right-of-way acquisition required prior to letting design-build contract • Permitting and geotechnical borings prior to letting place contractors at ease and facilitate process
Project Management	**Preliminary Engineering**
• Co-locating project team for the entire duration of project facilitates coordination • Establish and maintain open communications channels, including regular progress meetings • Establish expectations of all parties prior to beginning work • Facilitate cooperative working relationship between contracting agency and design-build team • Recognize criticality of schedule • Provide efficient management structure • Establish meaningful incentives and penalties	• Development of original documents may have stifled contractor creativity and innovation • Carefully consider the appropriate level of design to complete prior to letting contract • Over-prescribing design details or construction techniques may stifle potential innovation • Focus technical scoring of proposals on areas that the agency values
Third-Parties	**Owner Participation**
• Effort and time to tie down third party (railroads, utilities, local agencies) commitments prior to project award is essential	• There is major effort required of the project contracting agency, so design-build should be used only when it provides the most effective delivery means • Successful management of design-build may require a new approach to project administration by the contracting agency
Contract Language and Definitions	**Change Orders**
• To ensure the contracting agency receives the expected product within budget, clear and concise performance specifications are essential to the success of a design-build contract	• Establish funding responsibility for any unforeseen changes required in project design and construction
Risk Allocation	**Procurement**

• Allocate risks where they are best managed	• Design-build is not well suited to low-bid selection method

Source: D-B project survey: Q18, 49 responses

Exhibit V.2 Summary of Actual Design-Build Program Changes

Quality Assurance/Quality Control	Cooperation with Industry
• Better define quality control and who provides it. Third-party contracting of quality assurance • Change in QA/QC responsibility, with contracting agency responsible for quality assurance and contractor responsible for quality control, in lieu of previous arrangement in which contractor had responsibility for QA and QC and contracting agency had discretionary sampling and testing privileges	• Agency periodically conducts design-build workshops with industry partners, contractors and designers to refine delivery processes. Recent successes include continuity of agency selection team, debriefing process, agreement to include alternate technical concept, and one-on-one communication process during RFP stage.
Project Selection	**Procurement Regulations**
• Streamlining selection process	• Changed state statutes to permit best-value approach • Achieved regulatory authority to implement design-build
Preliminary Engineering	**Stipends**
• Reduce level of preliminary engineering and transfer this work to design-build contractors	• Use of stipends to offset cost of preliminary design for unsuccessful proposers
Environmental Monitoring	**Utilities**
• Placement of environmental monitors (agents of the state) on environmentally sensitive projects to ensure compliance with permit requirements of the contractor	• Incorporation of utilities design and construction into contract documents, making it a requirement of the design-build team
Contract Language and Definitions	**Baseline Information**
• Standardized contract language for design-build procurement, including general and project-specific requirements • Refinements of project scope definitions and standard specifications	• Providing upfront information such as soils, geotechnical, permit, and right-of-way information • Standardization of plan package content based on 30 percent plan details, including line, grade, and typical section for roadway and/or type, size, and location for structures
Risk Allocation	
• DOT works closely with AGC and ACEC to develop more focused risk allocation, used by agency to develop	

initial plans as well as proposal	

Source: D-B program survey: Q24, 27 responses

Exhibit V.3 Summary of Proposed Design-Build Program Changes

Quality Assurance/Quality Control	Cooperation with Industry
• Continued refinement of QA/QC plan	• Re-establishing partnership efforts with DOT, FHWA, contractors, and consulting engineers
Project Selection	**Procurement Regulations**
• Improved guidance for when to utilize innovative contracting methods • Incorporate more structures into program, and evaluate use of design-build on mega-projects, smaller projects, and bridge and ITS projects	• Considering deleting the Federal statutory definition of a "qualified project" so that SEP-14 will no longer be necessary for design-build projects that comply with FHWA's regulation.
Project Management	**Stipends**
• Bring construction engineering management in-house	• Development of a formal process for stipend determination
Contract Language and Definitions	**Risk Allocation**
• Clarifying third-party and quality assurance requirements • Refinement of contract language based on feedback from the contracting industry, consultants, FHWA, and DOT personnel • Revise program documents to make easier to use • Continued refinement of contract template	• Move all responsibility for project decisions, quality control, engineering, and inspection to the contractor, who would hold a comprehensive warranty to cover workmanship repairs and defects. Contractor would be held accountable for the entire project (i.e. no shared responsibilities). Difficult to accomplish within the culture of the transportation and insurance industries

Source: D-B program survey: Q25, 25 responses

Among project survey respondents, 33 percent reported that their projects could have been more successful with what they know now about the design-build process. Suggestions for further improving the design-build process included:

- More careful selection of projects appropriate for design-build
- Better definition of the contracting agencies' and contractors' project scopes
- Creation of more accurate bidding documents

- Selection of design-build consortium on a best-value rather than low-bid basis
- Modification of the quality control procedures
- Development of a procedure to review project design and manage construction issues

CONCLUSIONS

Based upon the results of this study, the following conclusions are offered regarding the future disposition of design-build as an alternative method for delivering highway projects, relative to the areas of interest defined by Section 1307 (f) of TEA-21, which mandated this study:

Impacts on Project Timeliness

- The greatest motivation and realized benefit to a contracting agency of using design-build instead of design-bid-build contracting is the ability to reduce the overall duration of the project development process by eliminating a second procurement process for the construction contract, reducing the potential for design errors and omissions, and allowing for more concurrent processing of design and constructing activities for different portions of the same project. Procurement efforts increase with design-build due to the extra effort put into crafting more clearly-defined contract documents, terms, and oversight requirements and responsibilities. In contrast, contracting agency contract administration and field inspection requirements decrease when the design-builder assumes more responsibility for quality control and there was greater reliance on performance-based progress billing.

Impacts on Project Cost

- The impact of project delivery approach on project cost is more difficult to establish and the range of both cost increases and decreases was quite wide. Project costs are much more likely to be impacted by the following factors that are beyond the control of the design-builder:
  - Nature and complexity of the project;
  - Third-party requests for changes to the plans and the project; and
  - Quantity contingencies (typically +/- 10-percent) included in unit price-based design-bid-build contracts that apply to change orders and quantity overrun items but which are not present in lump sum-based design-build contracts.

  This last factor provides greater opportunity for a design-bid-build contractor to pass on added project costs before having to negotiate a new unit price contract.

- Greater cost efficiencies are most likely to occur for design-build projects as a result of enabling the design-builder to propose more cost-effective ways to realize the performance objectives of the project. This can be achieved by:
  - Encouraging the design-builder to use the latest innovative technologies and methodologies to more fully leverage available public resources;
  - Integrating the design and construction activities to reduce the potential for design errors and discontinuities between the design plans and construction efforts that can result in fewer change orders and extra work orders; and
  - Shifting to greater use of performance-based specifications that promote design-builder creativity and decrease change orders.

Reducing the potential for cost growth through design-build contracting enables contracting agencies to budget more of their capital program funds for projects instead of reserves to cover cost increase contingencies. This provides for more efficient use of available funds, putting more of taxpayer money to work and delivering more projects.

- Significantly lower cost and number of claims for design-build projects reflect a fundamental shift in the adversarial nature of transportation construction contracting and bodes well for the future implementation of this procurement method, particularly for high visibility projects where cooperation between contracting agencies and their design and construction contractors is essential to project success.

Impacts on Project Quality

- Design-build does not appear to be a threat to the quality of highway projects. Indeed contracting agencies expressed equal satisfaction with the results of design-build and design-bid-build projects, suggesting that the choice of project delivery approach is neither a determinant of nor a threat to project quality. Overall contracting agency satisfaction was highest when design-build was used for large projects, when lower levels of preliminary design were performed prior to the design-build contract, and when contract selection was based on best value.

Level of Design Completed Prior to Design-Build Contract

- The use of design-build contracting provides an effective way for contracting agencies to gain access to specialized staff resources able to perform highly technical design work, with earlier value engineering and constructability reviews as part of the process. The level of preliminary design that should be completed before a design-build contract is procured depends on the size and complexity of the project, the ability of the design-builder to develop a more cost-effective and constructible project design in a timely and competent manner, and the degree to which performance specifications are used for the project. The survey results indicate higher contracting agency satisfaction with design-build projects that have lower levels of preliminary design performed before the involvement of the design-build team.

Impacts on Small Business

- The level of competition for design-build projects is somewhat smaller than for design-bid-build projects, most likely due to the newness and perceived risk associated with this particular project delivery approach to the Federal-aid highway program and the traditional design and construction firms that have served this program. This should increase as more design and construction firms participate on design-build project teams.

- Stipends or payments to unsuccessful proposers for design-build projects are frequently used to increase the number of capable proposers and thereby enhance competition for these types of procurements. Half of the projects surveyed offered stipends averaging $50,000.

- Design-build projects provide opportunities for smaller subcontractors to perform substantial portions of design-build projects. According to survey responses, small business contractors are playing comparable roles on completed design-build projects as for design-bid-build projects, with greater opportunities for subcontracting of the design work to smaller firms.

Subjectivity of Design-Build Contracting

- Cost remains the primary factor for awarding design-build contracts, even when other factors such as duration, team reputation, and quality are included in the deliberations. While low bid continues to be used as the basis for contract award decisions for many design-build projects, best-value approaches using multiple criteria including cost are gaining momentum. Best value selection provides for the consideration of both cost and other more subjective factors such project management, quality control, and team reputation and is gaining popularity among contracting agencies of design-build projects due to its ability to consider all relevant factors that affect the desirability of a design-build proposal.

Other Considerations

- While the use of design-build is not a panacea for delivering highway projects, there are clearly project features and circumstances that encourage its consideration if not use.
  - Medium to large projects that are more complex in nature and can benefit from the application of innovative concepts in project design and development earlier in the project conceptualization process are well suited to design-build project delivery.
  - New/widening, rehabilitation/reconstruction, and bridge/tunnel projects have the size and complexity to enable the private sector to apply more cost-effective ways to develop the project using design-build. These potential efficiencies permit design-builders to take on the higher project/contract risks associated with design-build contracting.
  - Projects that have a high sense of urgency (due to natural disasters or facility failures) or involve some kind of direct user fee-based financing are more likely to benefit from design-build contracting due to its ability to expedite project completion and/or facilitate the start of user fee-based revenue collection.
  - Projects with a dedicated revenue stream associated with completion (such as toll roads) provide added incentive for the public sector to complete a project on time and within budget.
  - Trained and capable contracting agency staff responsible for administering design-build projects must be designated for this method of project delivery, including procurement and contract administration processes.
  - The presence of a number of competent design and construction firms interested and willing to compete for work under the design-build contracting approach helps to ensure cost-competitive bids/proposals.
  - Public demands for accountability regarding project schedule and quality can be more readily met through the terms and conditions inherent in a design-build contract, where qualified design-builders take on more project risk associated with meeting the contract

schedule and performance criteria because of their ability to apply innovative techniques that lower the costs of project delivery while achieving desired performance results.

- A large number of agencies have now undertaken one or more design-build projects under the auspices of SEP-14 and tested different ways to apply design-build to many different types and sizes of projects. The knowledge gained from developing these programs and testing design-build provides a rich source of legislative, regulatory, procedural, and institutional documentation and insights to help institutionalize this process as an option for contracting agencies to consider as they develop their highway improvement programs and projects.

- While some states have cut back their design-build programs (such as Michigan, Ohio, and New Jersey), having completed the urgent projects that first prompted their interest in design-build, other states (such as Florida and Pennsylvania) are building on their growing knowledge base and success to propose increasing numbers of projects for design-build. This is becoming a self-fulfilling process as local design and construction firms participate in these projects and gain familiarity and confidence in their ability to delivery projects using design-build contracts and to make a reasonable rate of return for their efforts and risks.

- Nationally there is an extensive array of reports, books, periodicals, research studies, practice guides, and project evaluation reports to inform prospective and current practitioners in the use of design-build contracting for highway projects. There is also ample experience gained by various states in the use of design-build for a whole variety of projects to enable any first-time user to obtain useful insights and documentation on rules, regulations, policies, and procedures to set up and apply design-build with greater confidence that those early experimenters who first applied design-build during the early years of SEP-14. Among the states with well established design-build programs and significant documentation on their programs and projects are Florida, Pennsylvania, Michigan, and Ohio. Emerging major users of design-build include the states of Maryland, New Jersey, North Carolina, Indiana, Utah, Texas, and Virginia who have continuing and expanding design-build programs.

- The Design-Build Contracting Regulations[1] provide wide latitude to transportation agencies in the use of design-build contracting if they choose to apply this project development approach provided there are reasonable controls in place to:

  - Protect the public interest in obtaining a cost-effective project that meets or exceeds stated performance standards over time;
  - Minimize the opportunity for waste, fraud, and abuse due to favoritism in the selection process; and
  - Promote competition, particularly among competent local and national firms of all sizes and capabilities that can participate on design-build project teams.

[1] 23 CFR part 636

Minimum levels of participation by the prime contractor of a design-build team are no longer required under these regulations. This will encourage even greater use of local and small subcontractors to support the design-build teams, thereby ensuring their open and competitive access to design-build highway projects.

RECOMMENDATIONS

Based upon the results of this study, the following recommendations are offered to improve the use of design-build for delivering highway projects.

- The FHWA should continue to work with AASHTO and industry representatives to develop suggested guidelines and illustrative documents for use by contracting agencies interested in evaluating the design-build project delivery method. The FHWA recognizes this need and continues to support the activities of the AASHTO Design-Build Task Force and the design-build related research performed under the National Cooperative Highway Research Program (NCHRP). Two current research studies will be effective in accomplishing these goals: (NCHRP Project 25-25(12) - "Design-Build Environmental Compliance Process and Level of Detail Required" and NCHRP Project 20-07, Task 172, "Recommended AASHTO Design-Build Procurement Guide").

- To the extent practical, contracting agencies should provide for flexibility in the design criteria by using performance criteria to encourage creativity by the design-build proposing teams while providing a basis to hold the team accountable for project results.

- Preliminary designs that are incorporated in the RFP should be no more than 30 percent complete, dropping to lower levels as the size and complexity of the project increases and the contracting agency gains greater experience with this project delivery approach and the use of performance-based specifications.

- Raising the expertise and experience among transportation agency managers is a key challenge. Transportation agencies should invest in design-build training <u>before</u> attempting to execute their first design-build project. That training should include not only contracting agency personnel but also consulting engineers and construction contractors that will compete for these projects. On-going design-build training sessions could be used to institutionalize lessons learned for completed or active design-build projects.

CLOSING REMARKS

The changing nature of the nation's highway infrastructure development program and resources, at the federal, state, and local levels, is placing increasing burdens on the public sector's ability to meet the growing needs for renewed and expanded system capacity. Innovative techniques like design-build have been shown to offer significant potential to help transportation agencies better serve these needs by doing things faster and more cost-effectively. While many of the conditions that spawned the promulgation of highly restrictive contracting laws and procedures early in the twentieth century are no longer in evidence, care must be taken to prevent a repeat of these conditions. This is why the use of techniques like design-build contracting must be viewed and entered into with the understanding that the public and private participants in the process have a shared interest and liability for the results of the process, and are each held accountable for the results.

Design-build contracting represents a collaborative effort that integrates the various resources involved in the development of a highway project and provides incentives for a high level of technical performance and consistency with contractual budget and schedule terms. It has the potential to produce a more cost-effective project in less time than a process that contractually insulates the project participants while leaving the contracting agency with most of the project risk. The following quotes reflect the views of many of the respondents to the design-build surveys:

- *"We are sold on design-build. We feel that it offers the department an excellent option for procuring work faster and potentially more effectively that the traditional design-bid-build method." (a representative from the Construction Division , Utah Department of Transportation)*

- *"The design-build technique for transportation [project] delivery has provided the department with another tool to meet the needs of our customers, the traveling public. This technique allows us to move from concept to concrete at an accelerated pace which has helped us to meet the needs of local municipalities quickly. We could not have met the President's and Governor's economic stimulus initiatives had we not had the design-build option. This program has been extremely beneficial." (a representative from the Florida DOT)*

- *"We utilized the design-build contracting method to [respond] to a significant increase in the bridge construction budget with little time to implement [the project]. Design-build effectively brought the program to construction." (a project manager from the Michigan DOT)*

- *"This project would not have been possible without design-build project delivery." (a representative from the Alameda Corridor Transportation Authority)*

APPENDIX A

GLOSSARY OF TERMS

A + B: The contractor bids both the standard pay items plus the time required to complete the project. This total bid is then used to determine the lowest bidder for award purposes.

A + B Bidding: An adjustment to the price proposal to reflect the worth of time ("B").The contractor bids both the standard pay items plus the time required to complete the project. This total bid is then used to determine the lowest bidder for award purposes.

Adjusted Bid: price proposals are opened after the technical proposals are scored. When the price proposal is opened, the project price is adjusted in some manner by the technical score, typically through the division of price by a technical score between 0 -1. The adjusted bid is used only for project award. The offered will be paid according to the price stated in the price proposal. The offeror with the lowest adjusted bid will be awarded the project.

Adjusted Score: price proposals are opened after the technical proposals are scored. The adjusted score is calculated by multiplying the technical score by the total estimated project price and then divided by the price proposal. The award made is to the offeror with the highest adjusted score

Allowable Contract Time: (adjusted contract time) Original contract time plus any contract time granted for weather, extra work, and unforeseen conditions.

Alternative or Innovative Contracting: Various methods of contracting authorized by state statute that departs to some degree from the traditional design-bid-build low-bid process. These methods include but are not limited to Time-Plus-Money (A + B), Design/Build, Warranty, and Incentive/Disincentive.

Bid Averaging Method (BAM): The contractor with a bid closest to the average of all the bids is awarded the contract.

Best Value: The overall maximum value of the proposal to a sponsor after considering all of the evaluation factors described in the specifications for the project including but not limited to the time needed for performance of the contract, innovative design approaches, the scope and quality of the work, work management, aesthetics, project control, and total project cost of the formulas or other criteria for establishing the parameters for the Best Value are generally clearly defined with the goal of being objective.

Bid Proposal: A technical proposal and a separately sealed price proposal submitted by each Design-Build Firm.

Bonus: A monetary incentive placed on a specific milestone within a contract for the expressed purpose of completing that element within the prescribed time.

Building Project: A project that provides rest areas, weigh-in-motion facilities, maintenance depots, toll highway service plazas, welcome centers, and other buildings incidental to the highway system.

Change Order: a written order to the contractor detailing changes to the specified work quantities or modifications in the scope of the original contract.

Claim: a continued demand for payment by the contractor that has been previously denied under the contracting agency's change approval procedures.

Cost-Technical Tradeoff: this approach involves calculating the technical score and the price score increment and then examining the difference between the incremental advantages of each. The increment in the technical score is calculated by dividing the highest technical score by the next highest technical score less one multiplied by 100%. The increment in price score is calculated by dividing the highest price score by the next highest price score less one multiplied by 100%. The award is to the offeror with the lowest price, unless the higher priced offers can be justified through a higher technical value. This justification is made by determining if the added increment of price is offset by an added increment in technical score.

An alternative qualitative version of this approach is used by many federal agencies under the Federal Acquisitions Regulation. This version relies on the judgment of the selection official and not on the evaluation ratings and scores. The final decision consists of an evaluation, comparative analysis, and tradeoff process that often require subjectivity and judgment on the part of the selecting official.

Design-Bid-Build: The traditional method for building highways and making highway improvements where the state transportation department (STA) or a consulting engineer working for the STA designs the project, solicits bids, and awards the construction contract to the lowest responsive bidder (construction contractor) to build the project.

Design-Build: the process of entering into a single contract with a contractor in which the contractor agrees to design and build a highway, structure or facility, or any other items required in an RFP.

Design-Build Contractor (or Design-Build Firm): An individual, company, firm, partnership, corporation, association, joint venture or other legal entity that is permitted by law to provide the necessary design and construction services, including engineering, architecture, construction contracting, and contract administration. The entity may include a construction contractor as the primary party with a design professional as the secondary party or vice versa. The contractor or design professional cannot team with other partners to submit more than one bid per project. Likewise, the secondary part of the design-build team, either designer or contractor, cannot change after award. Design-Build Contractor means the same as Design-Builder.

Design-Build Package (also Design and Construction Criteria Package): Document published by the STA that contains the Public Advertisement (Notice to Bidders), the Request

for Proposals, General Requirements, Design Scope of Work, Technical Specifications, Price Proposal Documents including the Bid Schedule, and any forms, drawings and other supporting documents necessary to guide the proposers in preparation and submittal of a proposal for a design-build project.

Disincentive: Monies subtracted from the contractor for completing the project later than time allowed for in the contract, or other performance-related penalty.

Fixed Price – Best Design: this approach uses a maximum price or a fixed price for the project. Offerors must submit a price proposal that is equal or less than the specified bid price. The award is based only on the technical proposal evaluation. The offeror selected will be the one whose technical score is the highest.

Incentive: Monies paid to the contractor for early completion of a project as provided for in the contract. Incentives may be paid for on A + B, Bonus, Incentive/Disincentive, Liquidated Savings, and Escalating Incentive/Disincentive contracts.

Incentive/Disincentive: Various methods of contracting authorized by state statutes which apply an incentive for early completion or a disincentive for late completion by the contractor. These methods include but are not limited to Incentive/Disincentive and Escalating Incentive/Disincentive arrangements.

Lane Rental: Method to reduce the impact to the traveling public by charging the contractor for blocking a lane during construction.

Letters of Interest (LOI): Refers to the process that establishes criteria for evaluating interested design-build contractors for the short-listing process. Criteria required for letters of interest is stated in the advertisement. In some states, firms desiring to submit bid proposals on design-build projects must submit a letter of interest setting forth the qualifications of the members of the firm and providing any other information required by the project announcement.

Liquidated Savings: The contractor is able to receive an incentive payment for early completion of a project. This incentive is tied to the amount of savings to the STA for this early completion.

Low Bid - Meets Technical Criteria: final award decision is based on price. Technical proposals are scored before any cost proposals are reviewed. The price proposal is opened only if technical proposal is above the minimum technical score. If it is below the technical score, the proposal is deemed non-responsive and the price proposal is not considered. Award will be determined by the lowest prices, fully qualified offeror.

Lump Sum: The contractor is required to perform a take off on the contract plans in order to develop project quantities. The contractor then submits lump sum bid for the entire contract.

Non-Responsive: Refers to any letter of interest that does not meet the criteria identified in the short-listing process or any proposal that does not comply with the criteria defined in the Request for Proposal.

Price Proposal: Contains the proposer's price for performing the work contained in the technical proposal and specified in the design-build package. In general, the price proposal is sealed and completed only on forms included in the design-build package. The proposer for an A + B type of price proposal also quotes a specified project time.

Project: The project to be designed and constructed as described in the public announcement.

Project Manager: The STA's designee responsible for administering the design-build project.

Proposer: A design-build firm or joint venture submitting a technical proposal for a design-build project.

Request for Proposal (RFP): The package to be provided to the firms qualified to bid on a project. It may contain, but is not limited to a detailed scope of work, including design concepts, technical requirements and specifications, time allowed for design and construction, STA's estimated cost of the project, deadline for submitting a proposal, selection criteria and a copy of the contracts. FHWA approval of the RFP is required on FHWA oversight projects prior to authorization and the release of the RFP to short-listed Firms. The RFP must clearly define all functions and responsibilities required by the firm. This RFP should consist of the following:

- **Dates:** Technical proposal due date; STA's selection schedule; delivery of services/products date; STA's submittal reviews (if required) time period; and payout schedule.

- **Design and Construction Criteria:** The design and construction requirements clearly define the specifications essential to ensure that the project is designed and constructed to meet the needs determined by the STA.

- **Guidelines** for preparation/presentation of technical proposals and the following:
  - Proposal evaluation criteria
  - Price proposal requirements
  - Identification of the design-build firm's project manager
  - Insurance requirements
  - Subcontract services
  - Minority/disadvantaged business participation requirements
  - Bonding requirements

Request for Qualifications (RFQ): A frequent part of the design-build selection process that contains the desired minimum qualifications of the firm, a scope of work statement, project requirements, amount of stipend or reimbursement (if any) that the STA has determined will be paid to prospective firms who qualify for the short list, but are not awarded a contract, selection criteria that STA will use in compiling the short list of prospective Firms to consider, and a copy of the contract.

Responsive: A proposal that substantially complies with the criteria identified in the short-listing process or a proposal that contains all the information and level of detail requested in the RFP and complies with the design and construction criteria defined in the RFP or design-build package.

Road User Cost: Cost/value established by the STA related to the estimated delay costs/impacts caused by construction.

Scope of Work: Information provided or furnishes in the design-build package and RFP that describes the project work and provides the firm with the essential requirements.

Standard Bid: The traditional cost associated with the materials and labor to construct the project.

STA: State transportation agency.

Statement of Qualifications (SOQ): Refers to the process that establishes criteria for evaluating interested Firms. Criteria required for the SOQ is stated in the advertisement. Often, firms desiring to submit bid proposals on design-build projects must submit an SOQ setting forth the qualifications of members of the firm and providing any other information required by the announcement of the project.

Stipend: The fee paid to unsuccessful firms for development of a responsive proposal.

Technical Proposal: The design-builder's response to the Request for Proposals. This document contains detailed descriptions and methodology of the design-builder's approach to designing, constructing, and managing the project in accordance with the design-build package. The design-builder's conceptual design is included as well as a proposed construction sequence and schedule. Technical proposals are expected to be in-depth, and could contain tables, charts, drawings, plots, and sketches.

Time Bid ('B' Portion): This is the cost directly related to the time bid by the contractor and dollars per day established by the STA.

Time-Plus-Money: Various methods of contracting including but not limited to Lane Rental, A + B Bidding, and Liquidated Savings. These methods consider both the construction costs and time of project. Reduction of contract time is a critical consideration for these methods.

Total Bid: The standard bid cost and the time bid cost added together for determining the low bidder.

Warranties: An insurance policy to warranty a specific element or elements within the contract from premature failure.

Weighted Criteria: the technical proposal and the price proposal are evaluated individually. A weight is assigned to the price and each of the technical evaluation factors. The sum of these values becomes the total score. The offeror with the highest total score is selected.

APPENDIX B

PARTICIPATING SEP-14 PROGRAM AGENCIES AND CONTACT INFORMATION

State	Agency D-B Program Contacts	Program Survey Completed	Project Surveys Completed
AK	Mr. Gordon Keith Director of Construction & Operations Division Department of Transportation & Public Facilities 4111 Aviation Avenues Anchorage, Alaska 99519 (p) 907-269-0780 (f) 907-248-1573 E-mail: gordon_keith@dot.state.ak.us	Yes	1
AZ	Mr. John Louis Assistant State Engineer Roadway Engineering Group Arizona Department of Transportation 205 South 17th Avenue Mail Drop 611E Phoenix, Arizona 85007 (p) 602-712-7707 (f) 602-712-3475 E-mail - jlouis@dot.state.az.us Secondary Contact: Mr. Julio Alvarado - Assist. State Engineer Construction Group - ADOT 206 South 17th Avenue - Mail Drop 172A Phoenix, Arizona 85007 (p) 602-712-7323 (f) 602-254-5128	Yes	4
CA	TCA - Mr. James Brown, P.E. Chief Engineer Transportation Corridor Agencies 125 Pacifica, Suite 100 Irvine, California 92618 (p) 949-754-3428 (f) 949-754-3491 E-mail - brown@sjhtca.com *(for the TCA program and projects)*	Yes	2
CA	Mr. Manny Hernandez (310) 816-0460, Ext. 146 Alameda Corridor Transportation Authority One Civic Plaza - Suite 600 Carson, California 90745 (p) 310-816-0460, Ext. 197 or 146 (f) 310-233-7483 (c) 310-505-8203 E-mail: mhernandez@trenchteam.com (for the Alameda Corridor program/project)	Yes	1

State	Agency D-B Program Contacts	Program Survey Completed	Project Surveys Completed
CO	Mr. Dean Van DeWege Project Development Branch Manager Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 (p) 303-757-9040 (f) 303-757-9868 E-mail: dean.vandewege@dot.state.co.us (Secondary contact:James Zufall Assistant Project Development Manager (cell) 303-916-3204)	Yes	2
DC	Mr. John Deatrick Deputy Director and Chief Engineer IPMA - D.C. Department of Transportation Peoples Building 64 New York Avenue, N.E. Washington, D.C. 20002-3326 (p) 202-671-2800 (f) 202-671-4710 E-mail - john.deatrick@dc.go (program questionnaire only)	Yes	N/A
DE	Mr. Barry Benton Supervising Bridge Engineer Bridge Design Division Delaware Department of Transportation P.O. Box 778 800 Bay Road Dover, Delaware 19903 (p) 302-760-2311 (f) 302-739-2217 E-mail: bbenton@maildot.state.de.us	Yes	1
FL	Mr. Ken Leuderalbert Quality Initiative Manager Florida Department of Transportation 605 Suwannee Street - Room 210 Tallahassee, Florida 32399-0450 (p) 850-414-4792 (f) 850-414-4796 E-mail - ken.leuderalbert@dot.state.fl.us Secondary contact - Mr. Brian Blanchard State Roadway Design Engineer (p) 850-414-4377 (f) 850-414-9293 E-mail - brian.blanchard@dot.state.fl.us	Yes	7
GA	Mr. Michael Haithcock Assistant State Consultant Design Engineer Pre-Construction Division Georgia Department of Transportation Number 2 Capitol Square - S.W. Atlanta, Georgia 30334 (p) 404-657-9758 (f) 404-463-6136 E-mail - michael.haithcock@dot.state.ga.us	Yes	1

State	Agency D-B Program Contacts	Program Survey Completed	Project Surveys Completed
HI	Mr. Kevin Ito Technical Design Section Highway Division Hawaii Department of Transportation 869 Punchbowl Street Honolulu, Hawaii 96813 (p) 808-692-7548 (f) 808-334-8789 E-mail - kevin.ito@hawaii.gov (program questionnaire only)	Yes	N/A
IN	Mr. Walter Land Manager of Special Projects Contracts & Construction Division Indiana Department of Transportation 100 North Senate Avenue - Room 601 Indianapolis, Indiana 46204 (p) 317-233-3699 (f) 317-233-4929 E-mail: wland@indot.state.in.us	Yes	0
LA	Mr. Buddy Porta Road Design Engineer/Administrator Road Design Section Louisiana Department of Transportation 1201 Capitol Access Road Baton Rouge, Louisiana 70804-9245 (p) 225-379-1388 (f) 225-379-1351 E-mail - buddyporta@dotd.state.la.us (program questionnaire only)	No	N/A
MA	Mr. Thomas Broderick III Chief Engineer Massachusetts Highway Department 10 Park Plaza Boston, Massachusetts 02116 (p) 617-973-7830 (f) 617-973-8032 E-mail - thomas.broderick@mhd.state.ma.us (Secondary contact - Mr. Frank Suszynski, cell - (978) 589-1754)	Yes	N/A
MD	Ms. Lisa Choplin Assistant Division Chief Highway Design Division State Highway Administration Maryland Department of Transportation 707 North Calvert Street - C102 Baltimore, Maryland 21202 (p) 410-545-8824 (f) 410-209-5001 E-mail: lchoplin@sha.state.md.us	Yes	4

State	Agency D-B Program Contacts	Program Survey Completed	Project Surveys Completed
ME	Mr. Bradford Foley Assistant Program Manager Urban & Arterial Highways Division Maine Department of Transportation 16 State House Station Augusta, Maine 04333 (p) 207-624-3359 (f) 207-624-3481 E-mail: brad.foley@maine.gov	Yes	1
MI	Mr. Mark Van Port Fleet Engineer of Design Design Support Area Michigan Department of Transportation P.O. Box 30050 Lansing, Michigan 48909 (p) 517-373-0030 (f) 517-241-4619 E-mail - vanportfleetm@michigan.gov	Yes	10
MN	Mr. Paul Huston, P.E. Design-Build Program Manager Minnesota Department of Transportation 395 John Ireland Boulevard, MS 670 St. Paul, Minnesota 55155 (p) 651-284-3605 (f) 651-296-1805 E-mail - paul.huston@dot.state.mn.us (program questionnaire only)	No	N/A
NC	Mr. Steve Dewitt State Construction Engineer North Carolina Department of Transportation 1 South Wilmington Street - 2nd Floor Raleigh, North Carolina 27601 (p) 919-733-2210 (f) 919-733-8441 E-mail - sdewitt@dot.state.nc.us Secondary Contact:Tim Boland (704)982-0101	Yes	1
NJ	Mr. Richard Gramlich Director - Division of Project Management New Jersey Department of Transportation 1035 Parkway Avenue Trenton, New Jersey 08625-0600 (p) 609-530-2191 (f) 609-530-2532 E-mail - richard.gramlich@dot.state.nj.us (Secondary contact - Joe Bertoni - Project Manager)	Yes	7

State	Agency D-B Program Contacts	Program Survey Completed	Project Surveys Completed
NM	Mr. Tony Abbo Design-Build Project Engineer New Mexico State Highway & Transportation Department P.O. Box 1149 Santa Fe, New Mexico 87504-1149 (p) 505-827-9852 (f) 505-827-5642 E-mail - tony.abbo@nmshtd.state.nm.us (program questionnaire only)	Yes	N/A
NV	Ms. Susan Matinovich Deputy Director Nevada Department of Transportation 1263 South Stewart Street Carson City, Nevada 89712 (p) 775-888-7440 (f) 775-888-7115 E-mail - info@dot.state.nv.us (program questionnaire only)	Yes	N/A
NY	Mr. Daniel D'Angelo Director Design Quality Assurance Bureau New York State Department of Transportation 1220 Washington Avenue, 5-410 Albany, New York 12232-0751 (p) 518-457-6467 (f) 518-457-6477 E-mail - ddangelo@gw.dot.state.ny.us (Secondary contact - Mr. Richard Lee,	Yes	N/A
OH	Mr. Cash Misel, P.E. Assistant Director Office of Planning & Production Management Ohio Department of Transportation 1980 West Broad Street Columbus, Ohio 43223 (p) 614-466-2448 (f) 614-466-0587 E-mail - cash.misel@dot.state.oh.us (Secondary contact -	Yes	12
OR	Mr. Robert (Bob) Burns Highway Division Oregon Department of Transportation 1144 Center Street Salem, Oregon 97301 (p) 503-986-3801 (f) 503-986-4469 E-mail - robert.g.burns@state.or.us	No	0

State	Agency D-B Program Contacts	Program Survey Completed	Project Surveys Completed
PA	Mr. Tucker Ferguson Chief of Contract Management Division of Construction and Materials Pennsylvania Department of Transportation Transportation & Safety Building - 7th Floor Harrisburg, PA. 17120 (p) 717-787-7894 (f) 717-787-7969 E-mail - ferguhl@dot.state.pa.us (Secondary contact - Mr. David Azzato Chief Contract Development Design & Award Section, Bureau of Design (p) 717-787-5914 (f) 717-783-6412 E-mail - dazzato@state.pa.us)	Yes	8
SC	Mr. Rocque Kneece Program Development Engineer Program Management Division - East South Carolina Department of Transportation 955 Park Street - Suite 427 Columbia, South Carolina 29202 (p) 803-737-1127 (f) 803-737-3590 E-mail - KneeceRL@scdot.org	Yes	2
SD	Mr. Monte Schneider Development project Engineer Division of Planning & Engineering South Dakota Department of Transportation 700 East Broadway Avenue Pierre, South Dakota 57501 (p) 605-773-3268 (f) 605-773-6608 E-mail - monte.schneider@state.sd.us	Yes	1
TN	Mr. Jeffery Jones Design Director Tennessee Department of Transportation 505 Deaderick Street - Suite 1300 Nashville, Tennessee 32343-0349 (p) 615-741-2221 (f) 615-532-2799 E-mail - jeff.c.jones@state.tn.us (program questionnaire only)	Yes	N/A

State	Agency D-B Program Contacts	Program Survey Completed	Project Surveys Completed
TX	TTA - Mr. Phillip Russell - Director Texas Turnpike Authority 125 East 11th Street Austin, Texas 78701 (p) 512-225-1311 (f) 512-936-0970 E-mail - prussel@dot.state.tx.us (program questionnaire only) TexDOT - Mr. Thomas Bohuslav Director, Construction Texas Department of Transportation 125 East 11th Street Austin, Texas 78701-2483 (p) 512-416-2559 (f) 512-416-2539 E-mail - tbohusl@dot.state.tx.us	No	N/A
UT	Mr. Robert (Bob) Dyer Innovative Contracting Engineer Construction Division Utah Department of Transportation 4501 South - 2700 West Fourth Floor Salt Lake City, Utah 84114-8415 (p) 801-965-4384 (f) 801-965-4564 E-mail: rdyer@utah.gov	Yes	2
VA	Ms. Cyndi Ward Director of Special Projects Asset Management Division Virginia Department of Transportation 1401 East Broad Street Richmond, Virginia 23219 (p) 804-692-0390 (f) 804-786-8755 E-mail - cyndiward@virginiadot.org	Yes	1
WA	Mr. Jeffery Carpenter Innovative Contracting Engineer Washington State Department of Transportation P.O. Box 47300 Olympia, Washington 98504-7300 (p) 360-705-7804 (f) 360-705-6809 E-mail - carpenj@wa.gov	Yes	1
WI	Mr. Gary Whited Bureau of Highway Development Division of Transportation Infrastructure Development Wisconsin Department of Transportation Hillfarm State Office Building - Room 451 4802 Sheboygan Avenue Madison, Wisconsin 53707 (p) 608-267-7774 (f) 608-264-6667 E-mail - gary.whited@dot.state.wi.us	Yes	0

APPENDIX C

C-1 LIST OF TOTAL AND SURVEYED SEP-14 PROJECTS

State	Project	Date Completed	Final Cost (Millions)	Complete by Dec. 31, 2002	Included in Project Survey Sample	Project Survey Received	Compare to Design-Bid-Build
AL	Ferry boat	12/1/2002	$0 70	X			
AK	Ocean Class Ferry boat (Kennicott)	6/28/1998	$80 40	X			
AK	Whittier tunnel	5/30/2000	$57.00	X	X	X	X
AK	Very Fast Vehicle Ferry (option to buy up to 5 ferries)	N/A	$35.20				
AK	Glenn-Parks Interchange Project	N/A	$42 00				
AZ	Emergency Relief bridge Replacement	N/A	$3.50	X	X	X	
AZ	I-10/Cortaro Rd Interchange	N/A	$2.80	X	X	X	
AZ	I-17 Thomas Road to Dunlap Avenue, Phoeniz	7/1/2000	$75 00	X	X	X	
AZ	AZ State Route 68 near Kingman AZ, 13.5 miles reconstruction	N/A	$46.50	X	X	X	
AZ	US Route 60	N/A	$263 00				
AZ	AZ State route 51 inPhoenix between I-10 and Shea Blvd	N/A	$68 00				
CA	Alameda Corridor	4/1/2002	$740.00	X	X	X	
CA	Emergency Relief - LaCienega / Venice Undercrossing	N/A	$3 30				
CA	SR-125	6/26/1905	$105.00				
CA	TCA Foothills Eastern	6/1/1998	$504.00	X	X	X	
CA	TCA - San Joaquin Hills	6/1/1998	$795.00	X	X	X	
CA	TCA - Glenwood-Pacific Park Drive	6/1/1998	$7 20				
CO	Woodland Park urban street	N/A	$0.00				
CO	I-70 reconstruction, MP 336.8 for 11.4 miles	6/1/1999	$20.66	X	X	X	X
CO	I-76 Reconstruction, MP 418 - 427, Hudson to Keensburg	3/1/2001	$1.20	X	X	X	X
CO	Colorado Transportation Management System - System Integrator	N/A	$0 00				
CO	I-25 near Wellington, CO, 27 km roadway reconstruction	6/6/2001	$26.33	X	X		X
CO	TREX, formerly Southeast Corridor Denver I-25	N/A	$1,186.00				
DC	Emissions Inspection station	4/30/1999	$7.00	X			
DC	Local Street Upgrading (by EFLHD) Wards 3 and 4	N/A	$34 00				
DC	DC DOW Anacostia Riverwalk and Trail Project	N/A	$0.40				
DC	Taylor Street N E. bridge Replacement Project	N/A	$10.60				
DC	Southern Avenue S.E bridge Replacement Project	N/A	$8.00				
DE	Choptank Road over Back Creek	12/19/2001	$1.20	X	X	X	
FL	Peace River Drainage Canal	Complete	$3 87	X	X		
FL	Ringling Causeway	Active	$56.30				
FL	Peace River bridge/widen	Active	$52.98				
FL	Bee Ridge Rd. Repair/rehab	Complete	$1.49	X	X		
FL	US-17 add lanes & Reconst	Active	$17.97				
FL	US-41 add lanes & Reconst	Active	$4.47				
FL	SR-80 add lanes & Reconst	Active	$14.99				
FL	I-4 add lanes & Reconst	Active	$72.76				
FL	US 441 add lanes & Reconst	Active	$12 70				
FL	I-4 add lanes & rehab Pavt	Active	$59.60				
FL	I-4 Interchange(major)	Active	$62.15				
FL	SR 70 Slope rehab	Proposal	$3 38				
FL	Lake Okee Scenic Trail	Proposal	$2.27				
FL	Lake Okee Scenic Trail	Proposal	$5.62				
FL	I-75 Full Panel Replac wide bridge	Proposal	$7 69				
FL	I-75 Alligator Alley Fence	Proposal	$6.11				
FL	Add Lanes & Rehab Pavement	Active	$24.50				
FL	Add Lanes & Rehab Pavement	N/A	$16.20				
FL	Add Lanes & Rehab Pavement	Active	$25.60				
FL	ITS Surveillance System	N/A	$5.47				
FL	Add Lanes & Rehab Pavement	N/A	$4.71				
FL	Add Lanes & Rehab Pavement	N/A	$23 49				
FL	Weigh station	Active	$2.91				
FL	St. George bridge Replacement	Active	$71.68				
FL	Resurfacing	Complete	$1.48	X			
FL	Welcome station	Active	$5.87				
FL	Blackwater River bridge	Complete	$30.44	X	X		

Note: Highlighting indicates projects for which project surveys were received.

State	Project	Date Completed	Final Cost (Millions)	Complete by Dec. 31, 2002	Included in Project Survey Sample	Project Survey Received	Compare to Design-Bid-Build
FL	Hathway bridge	Active	$81.52				
FL	Ochlockonee River bridge	Complete	$12.21	X	X		
FL	I-10 rest areas	Active	$29.45				
FL	US-27, 3r, Milling, resurf	Active	$4.87				
FL	SR-80, 3r	Active	$9.14				
FL	Misc Constr	Complete	$2.18	X			
FL	Replace Movable span	Active	$10.59				
FL	Interchange	Complete	$2.05	X	X	X	X
FL	Drainage Improvements	Active	$10 98				
FL	I-95 widening	Active	$67 30				
FL	I-95 3r, widening	Active	$5.12				
FL	Resurfacing	Complete	$0.64	X	X	X	
FL	Pedestrain overpass	Complete	$2.13	X	X	X	
FL	Traffic control system	Active	$0.67				
FL	Pedestrain overpass	Complete	$1.12	X	X	X	
FL	ITS Surveillance System	Active	$3 50				
FL	Pedestrain overpass	Complete	$0.97	X			
FL	I-95 rest area	Active	$9.29				
FL	Pedestrain overpass	Complete	$2 63	X			
FL	Add Thru Lanes	Active	$51.10				
FL	Resurfacing	Active	$6.60				
FL	St. John River bridge	Active	$2.63	X	X		
FL	Add Lanes & Rehab Pavement	Complete	$3.68	X	X	X	
FL	Widen bridge	Complete	$19.28	X	X	X	
FL	ITS Surveillance System	Complete	$1.58	X	X		
FL	Add Lanes & Rehab Pavement	Active	$2.36				
FL	Resurfacing	Active	$1.59				
FL	Safety Project	Active	$2 16				
FL	I-4 Aux Lane	Active	$13.96				
FL	Add Lanes	Active	$16.90				
FL	Sound Walls	Complete	$9.39	X	X	X	X
FL	ITS Surveillance System	Active	$6.00				
FL	ITS Surveillance System	Complete	$0.70	X			
FL	Pedestrain overpass	Active	$1.22				
FL	Resurfacing/Repave	Active	$0.36				
FL	ITS Surveillance System	Active	$1 35				
FL	Widening/Resurfacing	Active	$2 13				
FL	Access Improvement	Active	$4.93				
FL	Safety Project	Active	$0.42				
GA	I-95 Bryan County, N/O Jerico River to S/O US 17 (7.4 miles)	2/26/2003	$19.70				
GA	I-75 Turner-Crisp Cos., SR 159 to SR 300 (14 5 miles)	N/A	$51.90				
GA	I-75 Tift Co., N/O US-41 to the Turner Co. Line (8 miles)	N/A	$33.20				
GA	I-95 Glynn Co., Horse Stamp Church Road to US-17 (7 miles)	N/A	$27.50	X	X	X	
GA	Rest area reconstruction, Gwinnett and Franklin Counties	11/22/2002	$0 50	X	X		
GA	I-75 Lowndes Co., SR-133 to Cook Co. Line (13.7 miles)	N/A	$67.00				
HI	Kuihelani Highway on Maui	N/A	$15 00				
HI	Kamehameha Hwy, Kahuku Hospital drainage improvements	N/A	$0.00				
IN	#1 I-65, reconstruction--N. of SR 43 to S. OF US 24, Tippecanoe / White Co's	7/31/1999	$30 60	X			
IN	#2 I-65, reconstruction & Add Ln.-Cold Spring Rd. to I-465-Indianapolis, Marion Co	10/1/2001	$76.50	X	X		
IN	#3 I-65, reconstruction& Add Ln - 61 St. To I-80/94- Lake County	12/15/2000	$31.80	X	X		

Note: Highlighting indicates projects for which project surveys were received.

State	Project	Date Completed	Final Cost (Millions)	Complete by Dec. 31, 2002	Included in Project Survey Sample	Project Survey Received	Compare to Design-Bid-Build
IN	#4 I-65, reconstruction & Add Ln.-61 St. Interchange to S. of US 30- Lake Co.	12/15/2001	$31 30	X	X		
IN	#5 I-65, reconstruct I-65 / US-30 Interchange-Merrillville-Lake Co	6/1/2003	$29.90				
IN	#6 I-80/94, Reconstruct of Harrison and Clark Steet bridges over I-80/94- Lake Co..	11/1/2002	$5 50	X			
IN	#7 I-465 / I-70, Recostruction of Interchange in Indianapolis, Marion County	11/20/2002	$67.10	X	X		
IN	#8 I-80/94 reconstruction of Georgia and Chase bridges over I-80/94, Lake Co	N/A	$6.00				
IN	#9 Midwest Steel Hwy Grade Separation, Porter Co	N/A	$6 40				
LA	Replace Tensas River bridge and Approaches, LA 4, Tensas Parish	N/A	$0 00				
MA	Route 3 North, from Route 128 to the NH border	N/A	$385.00				
MD	US113 from US50 to MD589, four-lane highway on new align, Worcester Co	10/10/2000	$10.34	X	X	X	X
MD	MD32 at Samford Rd, interchg constr, Anne Arundel Co	9/29/2001	$6.50	X	X	X	
MD	MD695 from I-97 to MD10, widening, Anne Arundel Co	5/20/2002	$9 40	X	X	X	
MD	MD32 at Airfield Rd, interchg constr, Anne Arundel Co	7/1/2003	$10 00				X
MD	US50 from US301to MD410, widening for HOV, Prince George's Co	12/19/2002	$19.00	X	X	X	
MD	US113 from Jarvis Rd to Delaware state line, dualization, Wicomico Co	TBD	$10 70				X
MD	US29 from Blackburn to Dustin Rd, widen/interchg improvements, Montgomery Co	TBD	$28.30				
MD	MD216 from US29 to I-95, new alignment, Howard Co	TBD	$20.40				
ME	Bath-Woolwich bridge Replacement	8/1/2000	$46 60	X	X	X	X
ME	I-295 Commercial Street Connector Project	N/A	$17.50				
MI	Detroit Freeway Management System, atms / ATIS	4/1/1997	$32.80	X	X	X	
MI	I-94 / Vining Rd Interchange	11/7/1997	$14.90	X	X	X	
MI	US 23 pavement rehab project	10/11/1997	$7.60	X	X	X	
MI	I-94 Frazho& Martin bridge Deck Replacement	8/1/1997	$1 73	X			
MI	I-96 Wixom bridge Deck Replacement	10/1/1997	$1.05	X			
MI	I-75 Gardenia bridge Superstructure replacement	10/1/1997	$0 85	X			
MI	I-69 Wadham bridge Superstructure replacement	10/1/1997	$0.64	X			
MI	I-94 Burns bridge Deck Replacement	9/1/1997	$1.14	X			
MI	US-24 Rouge R bridge Deck Replacement	10/1/1997	$1 73	X			
MI	M-10 Lafayette & Us12 bridge Deck Replacement	7/1/1998	$3 54	X	X	X	
MI	M-10- Warren bridge Deck Replacement	7/1/1998	$2.04	X	X	X	
MI	M-10 Greenfield bridge Deck Replacement	6/1/1998	$2.06	X			
MI	I-75 Second bridge Deck Replacement	10/1/1997	$1.46	X			
MI	I-96 BL GTW RRbridge Deck Replacement	7/1/1998	$3.75	X			
MI	I-696 M-10 bridge Superstructure replacement	10/1/1998	$0.99	X	X	X	
MI	M-28 Ontonagon River bridge Deck Replacement	10/1/1998	$0 73	X			
MI	I-94 Rouge River B& GTW RRridge Superstructure replacement	10/1/1998	$4.90	X	X	X	
MI	US 131 - 84th Street Overpass - bridge replacement	10/1/1999	$3.30	X	X	X	
MI	I-94 Harper bridge Deck Replacement	10/1/1998	$1.55	X	X	X	
MI	Beaver Island Ferry boat	N/A	$2.40				
MI	I-275 reconstruction, 8.3 km, 5 Mile Road to I-696, Wayne and Oakland Co.	11/7/2001	$49.30	X	X	X	
MN	I-35 pavement rehabilitation	N/A	$7.70				
MN	US Highway 52 (ROC 52)	N/A	$232 00				
NJ	Route I-280 Access Ramps	6/24/1998	$4.60	X	X	X	X
NJ	Local bridge Projects 11th Ave & 14th St	10/1/1998	$1.83	X	X	X	X
NJ	Local bridge Projects Bordentown - Georgetown Rd	1/30/1998	$1.51	X	X	X	
NJ	Local bridge Projects Oakview Ave, Roosevelt and Westervelt Ave.	10/2/1998	$2.77	X	X	X	

Note: Highlighting indicates projects for which project surveys were received.

State	Project	Date Completed	Final Cost (Millions)	Complete by Dec. 31, 2002	Included in Project Survey Sample	Project Survey Received	Compare to Design-Bid-Build
NJ	Route 29 Improvements - Tunnel	3/2/2002	$70.93	X	X	X	
NJ	Routes 50 & 322 Interchange reconstruction	9/29/2000	$8 42	X	X	X	X
NJ	Route 9, 25K	6/30/2002	$57.94	X	X	X	
NJ	Enhanced I&M stations	8/1/2000	$63.16	X			
NM	US 70 in Hondo Valley, Ruidoso Downs to Riverside, 37 9 miles	N/A	$129 50				
NM	NM 528 Bernalillo and Sandoval Counties	N/A	$19 10				
NV	Reno Transportation Rail Access Corridor Project	N/A	$170.70				
NY	New York City DOT, pedestrian safety project	5/1/2000	$1.00	X			
NY	New York City DOT, Belt Parkway / Ocean Parkway bridge	N/A	$1.00				
NY	Port Authority of NY and NJ - Traffic Surveillance on George Washington bridge	8/20/1999	$17.54	X			
NC	CARAT ITS project	12/31/2002	$13 75	X	X	X	
NC	Statewide wetland mitigation	12/7/2008	$31.10				
NC	Reconstruction of I-77 and programmatic use of D-B	10/11/2004	$70.90				
NC	I-26 reconstruction from NC 225 to NC 280	8/1/2005	$83.70				
NC	rehabilitation & widening of I-85 from US-29 to NC73 in Mecklenburg County	10/1/2005	$87 73				
NC	US 64 - Knightdale Bypass	8/1/2005	$131.02				
NC	SR-1128 Ruin Creek Road from Graham Ave (SR-1218) to Dabney Dr (SR-1304)	11/1/2004	$9.10				
OH	OTT/ERI-2-44.103/0.000 roadway mill and resurface, deck overlays	11/30/1998	$2.60	X			
OH	WYA-231-27.868; bridge replacement	6/30/1998	$0.50	X			
OH	LOR-252-8.738; bridge replacement	9/30/1999	$2.00	X			
OH	LAK 2-12.231 bridge replacement	1/1/1900	$2.00	X	X	X	
OH	TUS -800-36.967; bridge replacement	6/30/1999	$0 20	X			
OH	CHP / CLA-68-0.0024.441 ; 1.2 km of new 4-lane highway 3 structures	8/31/2000	$13.90	X	X	X	
OH	Toledo Lucas County marine passenger terminal	N/A	$0.00				
OH	VAN-US127-12.39, replace 3 bridge decks	8/31/2000	$1.01	X			
OH	ALL-IR075-29.548, replace Swaney Rd. bridge deck	6/30/2000	$0 67	X			
OH	LOR-IR090-10.76, 4 lane resurfacing & deck overlays	8/31/2002	$13.80	X			
OH	MED-IR271-0.00, complete pavement replacement	10/31/2001	$17.31	X	X	X	
OH	ATB-SR045-19.92, SR45 over IR90 bridge widening	8/1/2001	$2.96	X			
OH	STA-IR077-11.85, add 3rd lane & replace existing pavement	5/30/2003	$24.00	X	X	X	
OH	GUE-SR660-4.98, replace 2 bridges	8/31/2000	$0.47				
OH	MIA-IR075-7.948, add 3rd lane & replace existing pavement	5/20/2003	$45 48				
OH	PRE-IR070-0.00, pavement rehab & bridge work	10/15/2001	$20.53	X			
OH	GRE-US35J-0.00, pavement planning & overlay	10/15/2001	$10.50	X			
OH	HAM-IR071-11.08, pavement planning & overlay	8/15/2002	$10.80	X			
OH	HAM-IR275-32.27, pavement rehab & bridge work	7/31/2003	$29.50				
OH	HAM-IR471-00.26, pavement rehabilitation	6/15/2002	$15.40	X			
OH	ROS-SR159-0 00, pavement repair & overlay	11/15/2000	$2.29	X			
OH	NOB-IR077-6.22, joint replacement & concrete overlay	8/30/2001	$10.65	X			
OH	CUY-IR480-19.93, noisewall retrofit panels	9/30/2000	$2.52	X	X	X	
OH	MAH-11-16.04, bridge Deck replacements	10/30/2002	$4.14	X	X	X	
OH	ATH-33-10.41, bridge Deck rehabilitation	5/2/2002	$1.80	X	X	X	
OH	TRU-80-9.08, Pavement & bridge rehabilitation	6/30/2002	$4.93	X			
OH	TUS-77-3.94, Pavement & bridge rehabilitation	8/15/2002	$9.19	X	X	X	
OH	BEL-70-16.60, Sign Upgrading	6/30/2002	$0.83	X	X	X	
OH	ATB-11-23.33, bridge deck replacement	5/11/2002	$0.72	X			
OH	SAN-6-14.76, rehabilitate 3 bridges	8/31/2002	$1.80	X			
OH	SAN-20-14.86, bridge rehabilitation	10/31/2001	$0 80	X			
OH	POR-224-0.00, resurfacing and safety Upgrading	6/30/2002	$3.70	X	X	X	

Note: Highlighting indicates projects for which project surveys were received.

State	Project	Date Completed	Final Cost (Millions)	Complete by Dec. 31, 2002	Included in Project Survey Sample	Project Survey Received	Compare to Design-Bid-Build
OH	PRE-40-1.33, bridge replacement	7/1/2002	$0.24	X			
OH	HAR-81-16.54, bridge deck replacement	6/30/2002	$0.33	X			
OH	MOT-4-4.83, bridge replacement	5/31/2002	$0 28	X			
OH	HEN-108-15.61, bridge rehabilitation	10/31/2002	$0.94	X			
OH	PAU-613-22 02, bridge replacement	10/31/2000	$0.57	X			
OH	FRA-71-14.39, Pavement rehabilitation, replacement, and safety upgrading	9/30/2001	$3.68	X	X	X	
OH	ALL-30-18.18, bridge Deck replacements	10/31/2001	$2 17	X			
OH	SUM-77-22.32, tower Lighting	10/30/2001	$1.67	X	X	X	
OH	HAN-103-16.57, bridge rehabilitation	7/5/2001	$0 46	X			
OH	ATB-11-25.16, bridge deck replacement	N/A	$9.26				
OH	SUM-77-15 47, bridge deck replacement and Painting	N/A	$1 41				
OH	DAR-705-11.02, culvert replacement	5/22/2003	$0.22				
OH	STA-77-0.00, resurfacing	N/A	$4 76				
OH	SUM-21-1.79, bridge widening	N/A	$1.00				
OH	GUE-77-7.68, bridge deck replacement and Painting	N/A	$2.00				
OH	PIC-22-17.03, bridge superstructure replacement	N/A	$2 73				
OH	TRU-11-9.08, Interchange Lighting	N/A	$2 07				
OH	TUS-77-7 55, 4 Lane Major rehab	N/A	$8.45				
OH	COS-16-7.18, culvert Replacement	N/A	$0 50				
OH	FRA-270-1.52, noise Wall replacement	N/A	$0.50				
OH	SEN-67-9.87, 2 Lane resurfacing	N/A	$1.43				
OH	Dist11-Wide-Sign, Replace Overhead Signs, Supports	N/A	$1.23				
OH	Dist11-Wide-Sign, Upgrade E1isting Signs	N/A	$1 32				
OH	MOT-48-5.16	N/A	$0 30				
OH	Dist2-Wide-Sign, District Wide Sign Upgrade	N/A	$0 30				
OH	HAN-37-10.81, bridge Repair, Deck Replacement	N/A	$0.40				
OH	FRA-270-17.47, noise Wall Replacement	N/A	$11.00				
OR	I-5 Surface Preservation	12/30/1999	$7.80	X	X		
PA	Wetland bank on US 220 project	N/A	$0.00				
PA	District 1 Warren Co, Expressway reconstruction	10/16/2001	$15 60	X	X	X	
PA	District 1 Veango Co., Bethel Sunville Rd., bridge Replacement	N/A	$0.00				
PA	District 1-0 Erie Land Lighthouse Restoration	N/A	$0.20				
PA	District 1-0 Warren County SR6-B04 bridge rehab and Replacement	N/A	$0.00				
PA	District 1-0 Erie County SR97-10M Betterment Project	N/A	$1.00				
PA	District 1-0 Mercer County SR62-10M Betterment Project	N/A	$1 80				
PA	District 2-0 Clearfield 53-A04 022C035 bridge Replacement	N/A	$0 00				
PA	Distict 2 Mifflin County 1005(A01), bridge over Kishacoquilas Creek	N/A	$5.50				
PA	District 2 McKean 6(A02&A03) bridges over Allegheny River and Railroad	N/A	$6.60				
PA	District 3-0 Tioga 0015-F13 037C1386 New 2 Lane bridge on SBL	7/27/2001	$8.60	X	X	X	
PA	District 3 Lycoming Deck Replacment on the Susquehana River bridge at Muncy	N/A	$9.00				
PA	District 4-0 Susquehanna 0706-570 045C034 Wyalusing Creek bridge	9/24/1998	$2.40	X	X	X	
PA	District 4-0 Wyoming 0029-770 047C026 Bowman's Creek bridge	N/A	$0 00				
PA	District 4 Luzerne, bridge Replacement Carey Ave	N/A	$27.50				
PA	District 4-0 Susquehanna 1037-570 bridge Replacement Dubois Creek	11/11/2001	$5.80	X			
PA	District 4-0 Susquehanna 0011-573 bridge Replacement Hallstead/Great Bend	N/A	$6.50				

Note: Highlighting indicates projects for which project surveys were received.

State	Project	Date Completed	Final Cost (Millions)	Complete by Dec. 31, 2002	Included in Project Survey Sample	Project Survey Received	Compare to Design-Bid-Build
PA	District 4-0 Wayne 9911-BRG New bridge Church Street Honesdale	N/A	$0.00				
PA	District 4-0 Luzerne 9900-BRG Pedestian bridge Wilkes-Barre	12/20/2002	$0.50	X			
PA	District 4-0 Pike 0434-470 bridge Replacement Sholola bridge	N/A	$0 00				
PA	District 4-0 Pike 1011-470 bridge Replacement Pond Eddy bridge	N/A	$0 00				
PA	District 4-0 Luzerne 2010-371 bridge Replacement	N/A	$0 00				
PA	District 4-0 Lackawanna 2003-250 bridge Replacement Cortez Road	N/A	$0.00				
PA	District 4-0 Susquehanna 547-571 bridge Replacement	N/A	$0.00				
PA	District 5-0 Lehigh 0078-07M Emergency Superstructure Replacement	11/20/2000	$3.10	X	X	X	
PA	District 5-0 Schuylkill 0081-02B bridge Replacement	N/A	$3.70				
PA	District 6-0 Chester 0029-50S 062C050 bridge Replacement	N/A	$1 00				
PA	District 6-0 Bucks 2006-02S 061C102 Deck Replacement	N/A	$2 10				
PA	District 8-0 Cumberland 0081 Section 27	11/16/2001	$9.00	X	X	X	X
PA	District 8-0 York 30 Expressway PM	10/25/2001	$2.60	X	X	X	X
PA	District 9-0 Bedford 30-13B Everett Bypass bridge Replacement	11/2/2000	$0.50	X	X	X	X
PA	District 9-0 Somerset 56-12B Replacement of 69 foot Pipe culvert	9/7/2000	$0.20	X			
PA	District 9-0 Cambria 22-CP3 Trace and RR bridge rehabilitation	8/29/2001	$1.30	X			
PA	District 9-0 Cambria Improve roads and parking facilities St. Francis College	10/28/1999	$0.70	X			
PA	District 9-0 Somerset 0219-022 4-lane pavement rehab w/ structures	N/A	$0.00				
PA	District 9-0 Somerset 0219-023 4-lane pavement rehab w/ structures	1/18/2002	$10.70	X	X	X	X
PA	District 9-0 Blair County SR9900 Prefab structure on ped/bike trail	N/A	$0.00				
PA	District 9-0 Huntingdon County SR 6900 Prefab structure on ped/bike trail	N/A	$0 00				
PA	District 9-0 Somerset 0219-024 4-lane pavement rehab w/ structures	N/A	$9 90				
PA	District 10-0 Jefferson 0830-0590 Access Brige overpass of I-80	N/A	$3 00				
PA	District 10-0 Indiana 0954 104C033 Two Lick bridge	N/A	$0 00				
PA	District 11-0 Allegheny 4003-A03 Nelson Run bridge	N/A	$0.00				
PA	District 11-0 Lawrence 3009-L04 Hickory Run bridge	N/A	$0.00				
PA	District 11-0 Beaver County 1022-B02 13th Street Blockhouse Run bridge	N/A	$1.10				
PA	District 11-0 Frazier Heights Interchange with developer	N/A	$0.00				
PA	District 11-0 Allegheny/Beaver Counties SR0060-A32&B20 2-bridge Deck Repl.	N/A	$10.70				
PA	District 11-0 Allegheny County Convention Center Infrastructure Phase III	N/A	$8.90				
PA	District 12-0 Fayette 201-06R TR 201 Rest Connellsville	N/A	$1.70				
PA	District 12-0 westmoreland 0066-R10 Appolo bridge	N/A	$6.30				
SC	Bridge Replacements- Reedy Creek, Enoree River	7/2/1997	$2.84	X	X		
SC	Bridge Replacement - Wateree River	8/1/1998	$7.86	X	X	X	
SC	Bridge Replacement - Stono Creek	N/A	$0.00				
SC	Conway Bypass	Dec. 2001	$386.30	X	X		
SC	Carolina Bays Parkway	6/1/2002	$225.40	X	X	X	

Note: Highlighting indicates projects for which project surveys were received.

State	Project	Date Completed	Final Cost (Millions)	Complete by Dec. 31, 2002	Included in Project Survey Sample	Project Survey Received	Compare to Design-Bid-Build
SC	SC 170 widening	3/1/2003	$65.70				
SC	Cooper River bridge Repl.	7/2/2005	$531 30				
SD	Reconstruction of I-229 from Western Ave. to Benson Rd. in Siou1 Falls	7/15/2002	$32.40	X	X	X	
TX	Texas Turnpike Authority - US183A and SH130	N/A	$986.30				
TN	MPW Nashville and Davidson County, ITS Parking and Traffic Guidance System	N/A	$2.10				
UT	ITS Traffic Operations Center project	10/31/1998	$4 57	X	X	X	
UT	ITS Interim traffic control System	12/31/1997	$1 50	X	X		
UT	I-15 reconstruction Project	7/15/2001	$1,325.00	X	X	X	
UT	Legacy West Davis Highway , Farmington to Salt Lake City, 19.3 km	TBD	$312.50				
UT	SR-176 lake Powell vehicle / passenger ferry system	12/1/2000	$2.65	X			
UT	12300 South Interchange	TBD	$65.50				
UT	11400 South Interchange	TBD	$25.80				
VA	Safety rest area / Welcome Center - NB I-85 (Mecklenburg County)	3/27/2002	$2.65	X	X	X	
VA	Safety rest area / Welcome Center - EB I-64 (New Kent County)	N/A	$7.90				
VA	Coalfields Expesseway	N/A	$1,600.00				
VA	Route 288 (I-64/288 interchange and I-64 to rt.250 connection)	10/30/2003	$236.00				
VA	Highway Advisory Radio, I-81 Pulaski, Montgomery, Roanoke & Botetourt counties	N/A	$1.00				
VI	Marine Cargo Terminal at Enighed Pond	N/A	$0.00				
WA	SR 500 and Thurston Way - new interchange	10/7/2002	$22.73	X	X	X	
WI	City of Milwaukee, Menominee Valley Viaduct	9/9/2002	$49.75	X	X		
	SUM		$13,934	140	86	69	17

Note: Highlighting indicates projects for which project surveys were received.

C-2 List of Design-Bid-Build Comparable Projects

State	Design-Bid-Build Project	Final Cost (Millions)	Design-Build Comparable	Final Cost (Millions)
AK	Parks Highway, MP 37-30	$15.50	Whittier tunnel	$57.00
CO	I-70, Pretoria East	$10.70	I-70 reconstruction, MP 336.8 for 11.4 miles	$20.66
CO	I-70, Cedar Point East	$16.50	I-76 Reconstruction, MP 418 - 427, Hudson to Keensburg	$1.20
CO	I-70, Strasburg East	$17.10	I-25 near Wellington, CO, 27 km roadway reconstruction	$26.33
FL	Turnpike Partial Interchange at Atlantic Boulevard	$3 40	Interchange	$2.05
FL	I-95 HOV Reconstruction (niose wall portion)	$1.30	Sound Walls	$9 39
MD	US 113 from MD 589 to Jarvis Road	$18.60	US50 from US301to MD410, widening for HOV, Prince George's Co	$19.00
MD	US 29, from I-70 to MD 100	$11.00	MD32 at Airfield Rd, interchg constr, Anne Arundel Co	$10.00
MD	US 29 Interchange at Hopkins/Gorman Road	$18.90	US113 from Jarvis Rd to Delaware state line, dualization, Wicomico Co	$10.70
ME	Casco Bay Bridge	$143.90	Bath-Woolwich bridge Replacement	$46.60
NJ	Route I-280, Section 7W	$12 00	Route I-280 Access Ramps	$4.60
NJ	Lumberton Vincentown Road Bridge Replacement	$1.30	Local bridge Projects 11th Ave & 14th St	$1.83
NJ			Local bridge Projects Bordentown - Georgetown Rd	$1.51
NJ			Local bridge Projects Oakview Ave, Roosevelt and Westervelt Ave.	$2.77
NJ	Route 73, Section 5C/Route 30, Sections 1E, 12B	$12.50	Routes 50 & 322 Interchange reconstruction	$8.42
PA	District 8-0 Franflin & Cumberland 0081 Section 025	$7.20	District 8-0 Cumberland 0081 Section 27	$9 00
PA	District 8-0 York 0030 Section 32/34	$2.10	District 8-0 York 30 Expressway PM	$2.60
PA	Tyrone Viaduct Rehabilitation/Maloy Street Rehabilitation	$5.30	District 9-0 Bedford 30-13B Everett Bypass bridge Replacement	$0.50
PA	S.R. 0219-018 Boswell Resurfacing, Somerset County	$18.00	District 9-0 Somerset 0219-023 4-lane pavement rehab w/ structures	$10.70
	SUM - Design-Bid-Build Projects	$315.30	SUM - Design-Build Comparables	$244.85

Note: Highlighting indicates projects representing the most similar projects to design-build comparables and the most complete data.

APPENDIX D

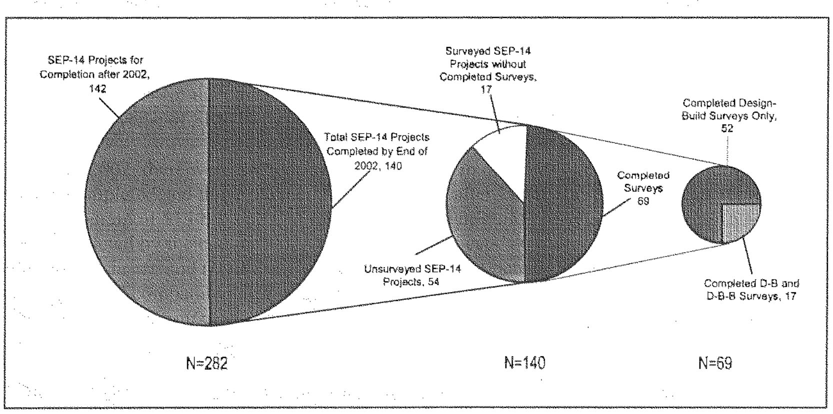
SURVEY DISTRIBUTION AND RESPONSE RATES

Program and project surveys were conducted on the fall of 2003 and the summer of 2004. The program surveys focused on the individual state design-build programs while the project surveys focused on selected design-build projects and comparable design-bid-build surveys completed by responding states participating in the SEP-14 program. This appendix describes the distribution and response rates for the design-build program and project surveys conducted for this study relative to universe of SEP-14 design-build programs and projects completed by the end of 2002.

By end of 2002, there were 282 design-build projects in the SEP-14 program, including projects already completed and those planned for completion after 2002. These 282 projects represented a capital program of $14 billion. Out of these 282 design-build projects, 140 projects (50-percent) were completed by the end of 2002. Of these 140 projects, 86 projects (61-percent) were selected for survey and 69 of these surveyed projects (80-percent) produced completed project surveys and 17 comparable design-bid-build project surveys (20-percent), based on project type, size, sponsoring organization. Out of the 17 returned D-B-B project surveys, 11 contained sufficient data to permit detailed analysis of project duration and cost by project phase.

Exhibit D.1 shows the breakdown of project surveys distributed and completed relative to the number of SEP-14 design-build projects completed by the end of calendar year 2002.

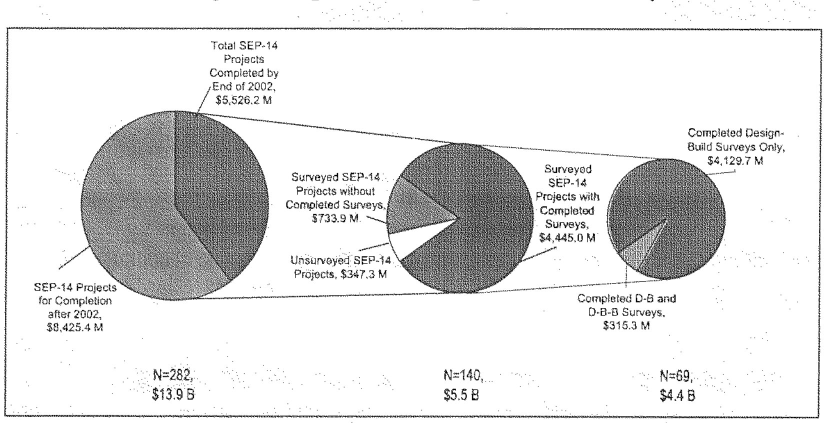
Exhibit D.1 Distribution of the Number of SEP-14 Design-Build Projects Surveyed and Completed Design-Build and Design-Bid-Build Surveys



* Design-Build Projects Approved Under SEP-14, Federal Highway Administration, July 2003

Out of $13.9 billion in total potential SEP-14 projects, $5.5 billion (40-percent) were completed by the end of calendar year 2002. Of this amount, $5.2 billion (94-percent) in completed projects were selected for survey. Completed design-build project surveys were returned representing $4.1 billion in project costs or 75-percent of completed project costs. $315 million worth of design-bid-build projects were also completed and retuned, which is 8-percent of the value of completed design-build surveys. Exhibit D.2 shows the cost breakdown of project surveys distributed and completed relative to the cost of SEP-14 design-build projects completed by the end of calendar year 2002.

Exhibit D.2 Distribution of the Cost of SEP-14 Design-Build Projects Surveyed and Completed design-build and Design-Bid-Build Surveys



* Design-Build Projects Approved Under SEP-14, Federal Highway Administration, July 2003

Exhibit D.3 shows the composition of surveys distributed and completed relative to the number of SEP-14 design-build projects by project type. As shown in Exhibit D.3, the sampling of design-build projects completed by the end of calendar year 2002 shows a fairly consistent numerical distribution by type of project in going from total completed projects to surveyed projects to completed surveys. In each group, Bridge/Tunnel and Road-New/Widen project types predominate. Only for the limited sample of design-bid-build projects does the distribution significantly change, with the Road-Rehabilitate/Reconstruct project type becoming more predominant. In terms of the cost categories of projects surveyed, there is also consistency in going from total completed projects to surveyed projects to completed surveys, with the $2-10 million category predominating, followed by the under $2 million and $10-50 million categories. In the case of the completed design-bid-build surveys, the $10-50 million category predominates. The Road-Rehabilitation/Reconstruction project category makes up most of this project sample.

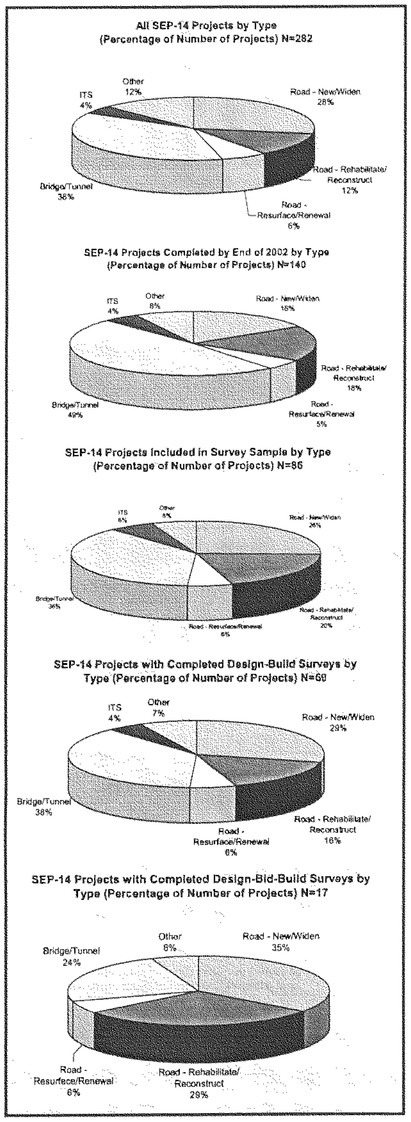
Exhibit D.4 shows the composition of surveys distributed and completed relative to the cost of SEP-14 design-build projects by project type. As shown in Exhibit D.4, the sampling of design-build projects completed by the end of calendar year 2002 shows a fairly consistent cost distribution by type of project in going from total completed projects to surveyed projects to

completed surveys. In each group, Road-New/Widen and Road-Rehabilitate/ Reconstruct project types predominate. Only for the limited sample of design-bid-build projects does the distribution significantly change, with the Bridge/Tunnel project type becoming more predominant. In terms of the cost categories of projects surveyed, there is also consistency in going from total completed projects to surveyed projects to completed surveys, with the over $100 million category predominating. This reflects the frequent use of design-build to delivery very large projects that are more difficult to produce under traditional project delivery approaches. In the case of the completed design-bid-build surveys, the $10-50 million category becomes more significant, reflecting the smaller typical size of design-bid-build projects.

The distribution and response rates for the program and project surveys were fairly high for the length and complexity of the survey instruments used. Only the comparable design-bid-build survey response rate was relatively low. Exhibits D.3 and D.4 show that the survey sample and completed projects are highly representative of the major types and sizes of design-build projects completed by the end of 2002 under the Sep-14 program. This suggests that the findings produced by the study surveys are fairly typical of design-build projects in the Federal-aid highway program.

Exhibit D.5 consists of a series of tables containing the number and percent distribution of projects surveys relative to the SEP-14 program, survey sample, and completed surveys, broken down by type and size of project.

Exhibit D.3 Composition of Surveys Distributed and Completed by Project Type and Size (relative to the number of projects)



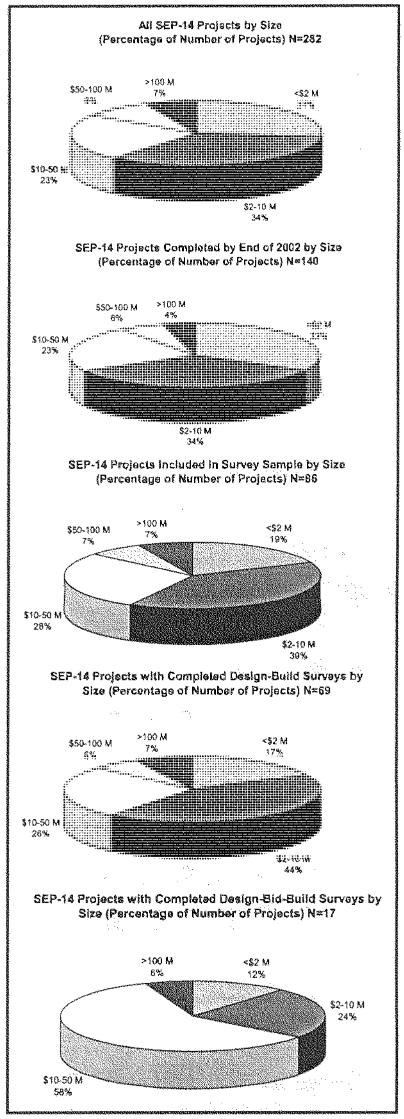
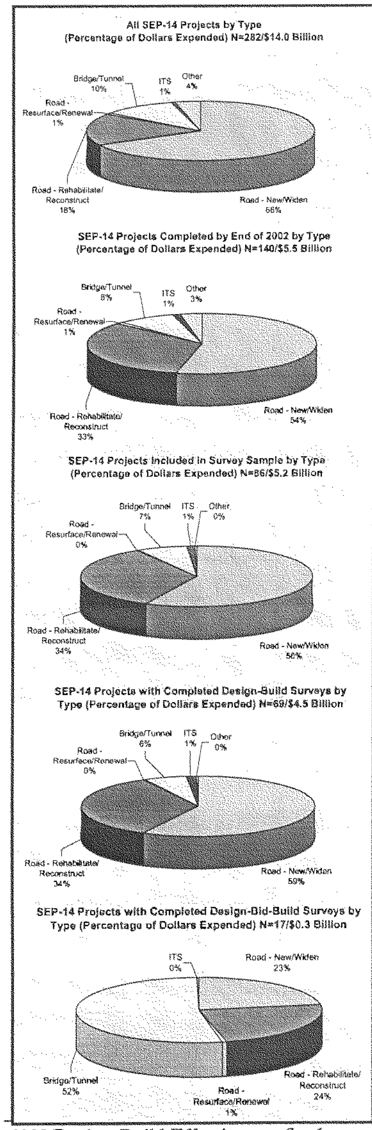


Exhibit D.4 Composition of Surveys Distributed and Completed by Project Type and Size (relative to project costs)



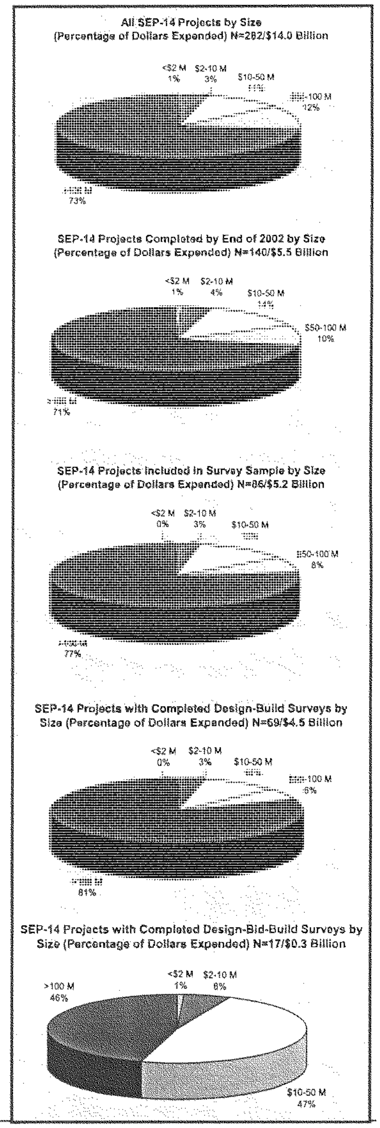


Exhibit D.5 Distribution of SEP-14 Projects Included In Study Surveys

Total SEP-14 Design-Build Projects - Proposed, Active, and Completed					
Project Type	**Number**	**%**	**Cost ($000)**	**%**	**$/Project**
Road - New/Widen	78	28%	$9,390.5	67%	$120.4
Road - Rehabilitate/Reconstruct	35	12%	$2,447.8	18%	$69.9
Road - Resurface/Renewal	17	6%	$105.1	1%	$6.2
Bridge/Tunnel	105	37%	$1,432.4	10%	$13.6
ITS	12	4%	$74.0	1%	$6.2
Other	35	12%	$501.7	4%	$14.3
Total	282	100%	$13,951.6	100%	$49.5
Project Size	**Number**	**%**	**Cost ($000)**	**%**	**$/Project**
<$2 Million	76	27%	$72.7	1%	$1.0
$2-10 Million	97	34%	$479.6	3%	$4.9
$10-50 Million	65	23%	$1,472.9	11%	$22.7
$50-100 Million	25	9%	$1,683.8	12%	$67.4
>$100 Million	19	7%	$10,242.6	73%	$539.1
N/A	0	0%	$0.0	0%	$0.0
Total	282	100%	$13,951.6	100%	$49.5

SEP-14 Design-Build Projects - Completed by 2002					
Project Type	**Number**	**%**	**Cost ($000)**	**%**	**$/Project**
Road - New/Widen	23	16%	$2,964.0	54%	$128.9
Road - Rehabilitate/Reconstruct	25	18%	$1,847.8	33%	$73.9
Road - Resurface/Renewal	7	5%	$31.3	1%	$4.5
Bridge/Tunnel	68	49%	$456.2	8%	$6.7
ITS	6	4%	$54.9	1%	$9.2
Other	11	8%	$172.0	3%	$15.6
Total	140	100%	$5,526.2	100%	$39.5
Project Size	**Number**	**%**	**Cost ($000)**	**%**	**$/Project**
<$2 Million	46	33%	$45.3	1%	$1.0
$2-10 Million	48	34%	$209.8	4%	$4.4
$10-50 Million	32	23%	$748.9	14%	$23.4
$50-100 Million	8	6%	$548.0	10%	$68.5
>$100 Million	6	4%	$3,974.2	72%	$662.4
N/A	0	0%	$0.0	0%	$0.0
Total	140	100%	$5,526.2	100%	$39.5

Exhibit D.5 Distribution of SEP-14 Projects Included in Study Surveys (continued)

Surveyed Completed Design-Build Projects					
Project Type	Number	%	Cost ($000)	%	$/Project
Road - New/Widen	22	26%	$2,961.8	57%	$134.6
Road - Rehabilitate/Reconstruct	17	20%	$1,764.3	34%	$103.8
Road - Resurface/Renewal	5	6%	$16.0	0%	$3.2
Bridge/Tunnel	32	37%	$365.5	7%	$11.4
ITS	5	6%	$54.2	1%	$10.8
Other	5	6%	$17.1	0%	$3.4
Total	86	100%	$5,178.9	100%	$60.2
Project Size	Number	%	Cost ($000)	%	$/Project
<$2 Million	16	19%	$19.9	0%	$1.2
$2-10 Million	34	40%	$159.7	3%	$4.7
$10-50 Million	24	28%	$619.1	12%	$25.8
$50-100 Million	6	7%	$404.5	8%	$67.4
>$100 Million	6	7%	$3,975.7	77%	$662.6
N/A	0	0%	$0.0	0%	$0.0
Total	86	100%	$5,178.9	100%	$60.2

Completed Design-Build Surveys					
Project Type	Number	%	Cost ($000)	%	$/Project
Road - New/Widen	20	29%	$2,567.7	58%	$128.4
Road - Rehabilitate/Reconstruct	11	16%	$1,530.8	34%	$139.2
Road - Resurface/Renewal	4	6%	$14.5	0%	$3.6
Bridge/Tunnel	26	38%	$263.8	6%	$10.1
ITS	3	4%	$51.1	1%	$17.0
Other	5	7%	$17.1	0%	$3.4
Total	69	100%	$4,445.0	100%	$64.4
Project Size	Number	%	Cost ($000)	%	$/Project
<$2 Million	12	17%	$14.8	0%	$1.2
$2-10 Million	30	43%	$142.6	3%	$4.8
$10-50 Million	18	26%	$437.3	10%	$24.3
$50-100 Million	4	6%	$260.9	6%	$65.2
>$100 Million	5	7%	$3,589.4	81%	$717.9
N/A	0	0%	$0.0	0%	$0.0
Total	69	100%	$4,445.0	100%	$64.4

Exhibit D.5 Distribution of SEP-14 Projects Included in Study Surveys (continued)

Completed Design-Bid-Build Surveys					
Project Type	Number	%	Cost ($000)	%	$/Project
Road - New/Widen	6	35%	$71.1	23%	$11.9
Road - Rehabilitate/Reconstruct	5	29%	$74.8	24%	$15.0
Road - Resurface/Renewal	1	6%	$2.1	1%	$2.1
Bridge/Tunnel	4	24%	$166.0	53%	$41.5
ITS	0	0%	$0.0	0%	$0.0
Other	1	6%	$1.3	0%	$1.3
Total	17	100%	$315.3	100%	$18.5
Project Size	Number	%	Cost ($000)	%	$/Project
<$2 Million	2	12%	$2.6	1%	$1.3
$2-10 Million	4	24%	$18.0	6%	$4.5
$10-50 Million	10	59%	$150.8	48%	$15.1
$50-100 Million	0	0%	$0.0	0%	$0.0
>$100 Million	1	6%	$143.9	46%	$143.9
N/A	0	0%	$0.0	0%	$0.0
Total	17	100%	$315.3	100%	$18.5

APPENDIX E

SURVEY INSTRUMENTS AND RELATED DOCUMENTATION

E.1 Email Cover Letter

From: Design-Build Study Team
Sent: Monday, October 20, 2003
To: State Transportation Agency Design-Build Program Managers
Subject: Request for Assistance Regarding FHWA Design-Build Study for Congress

This correspondence announces the long-awaited Program and Project surveys and instructions for the Design-Build Study for Congress being sponsored by the Federal Highway Administration, described below. The survey process is intended to be paperless. Therefore all communication is being done by e-mail, while the survey process is being handled through a website at the University of Colorado at Boulder.

Information on the study and each of the survey forms can be found on the study website, http://construction.colorado.edu/design-build. To access the survey files, you will need to use the following user name and password:

User name: flastname
Password: xxdot

This has been done to limit access to the survey forms to only those individuals designated to complete the surveys for each participating state and project.

Attached to this e-mail message are several pdf files. One file contains an official Request for Assistance letter which can be used to inform agency leadership that may have to approve staff commitments to this effort, as well as project staff that will be asked to complete the Project Surveys. Another file contains Survey Instructions. These files are attached to enable you and your designated staff to get prepared to complete the surveys and understand which projects are to be reported on, before actually beginning the on-line survey effort. If you need software to download the pdf files, please use the following link to obtain the necessary software from the Adobe Company: http://www.adobe.com

Please note that only states involved in the SEP-14 Program are being asked to complete the Program Survey. Also, only those states with design-build projects completed by the end of calendar year 2002 are being asked to complete Project Surveys for a selected number of these projects - as well as a comparable design-bid-build project (selected at your discretion) for each design-build project included in the study sample. The states and sampled projects are listed in the project website by clicking on the word: Survey, on the Design-Build Program and Project Survey section of the Home page, and then clicking on the Proceed to Program Survey and Proceed to Project Survey boxes, respectively.

Please have all requested surveys completed and submitted to the study

website on or before Friday, November 21, 2003. A member of the project Research Team, Dan Dornan, Keith Molenaar, Nate Macek, or Jennifer Shane will call to confirm the receipt of this email and answer any questions.

Thank you for your assistance in helping the FHWA-sponsored Research Team obtain the design-build program and project information essential to this important study effort. If you have any questions, please contact the Research Team at: Design-Build@construction.colorado.edu.

Sincerely,
Gerald Yakowenko, P.E.
FHWA Contract Administration Group
Office of Program Administration, HIPA-30

Daniel Dornan, P.E.
Research Team Project Manager
AECOM Consult, Inc.

Keith Molenaar, Ph.D.
Research Team Analyst
University of Colorado

(See attached file: Letter of Assistance.pdf)
(See attached file: Survey Instructions.pdf)

E.2 Letter of Assistance

TO: State Transportation Agency Design-Build Program Coordinators

FROM: The FHWA / SAIC Design-Build Study Research Team

DATE: October 2003

RE: **Request for Assistance Regarding FHWA Design-Build Study for Congress**

This letter requests your assistance helping the Federal Highway Administration (FHWA) respond to one of the requirements of the Transportation Equity Act for the 21st Century (TEA-21). This study has significant potential to help both FHWA and state transportation agencies (STAs) across the nation address one of the burning questions regarding the delivery of highway capital projects: what are the measurable differences between projects delivered using a design-build, as opposed to design-bid-build, delivery method. We hope you will appreciate the need for your assistance and the value of this effort for both your agency and other STAs. Before you decide on the merits of this request, please consider the following background information.

Background

While awaiting Congressional reauthorization of the federal highway trust fund, we are reminded that highway funding has not kept up with the needs. Consequently Congress and the Federal Highway Administration have encouraged the development and application of innovative techniques to leverage available transportation program funds and streamline the highway project development process. These include the use of innovative contracting approaches. Among these is the *design-build* project delivery approach.

In recent years there has been a lot of discussion about the advantages and disadvantages of the *design-build* project delivery approach. Proponents proclaim its advantages in terms of cost, timeliness, or quality. Opponents point out potential disadvantages in terms of contract development and administration, project control, and industry impacts.

Both sides have good reasons for their positions and are sincere in their views. Unfortunately there is more conjecture than fact behind these strongly-held views. Much of this is driven by agency and industry reluctance to change from **a** proven technique that has worked all these years - the more traditional *design-bid-build* approach.

Have you ever considered:

- *Whether one of these project development approaches is truly better than the other, in terms of cost, schedule, and quality?*
- *Whether certain types and characteristics of projects make them more suitable for design-build versus design-bid-build?*
- *What is the impact on the local design and construction firms when the design build approach is used, particularly smaller firms?*
- *Under what terms and conditions might one approach be preferred to the other?*

Members of AASHTO and the design and construction industries have also considered these same questions. The problem is that no definitive study has been conducted to address these issues. The subject is complex and requires in-depth information regarding state design-build programs and completed design-build projects. In addition, this information should be collected in an objective and unbiased manner based on actual program and project results from agencies such as yours.

We ask for your agency's involvement through its participation in one element of the study's fact-finding effort – namely completing several web-based surveys that are available on the study website (noted below).

There is no financial cost to your agency—FHWA is fully funding the study effort and therefore the study results will be available to all participants for no charge. The study report is due in the spring of 2004—before reauthorization—and will be made available to participating agencies upon completion.

The ultimate sponsor of the study is the U.S. Congress, with the Federal Highway Administration serving as administrator. The intended audience for the study report is the U.S. Congress and all stakeholders in the funding and development of highway capital projects, particularly those projects using federal funds.

With the Congressional mandate and the strong backing of the FHWA, we hope to have gained your commitment to participate in this important study effort. We assure you that this is not just another troublesome survey request but a <u>valuable</u> and <u>objective</u> fact-finding effort to produce usable results for all involved in developing our nation's highway system. The nature of the assistance being requested is described below. We have endeavored to streamline the fact-finding process as much as possible, while remaining true to the requirements of TEA-21 and Congress for this study.

Nature of Assistance Requested

In 1997, TEA-21 ushered in a new funding program for the nation's surface transportation systems. Section 1307 (f) of the act requires a comprehensive national study to evaluate the effectiveness of design-build contracting in the Federal-Aid highway program, with the results subsequently reported to Congress. The report to Congress will comprise the results of an extensive literature search, interviews with key stakeholders in the Federal-Aid highway program and the SEP-14 program, and surveys of state transportation agency representatives with design-build program or project experience.

Each STA with design-build experience under the SEP-14 program is requested to complete a design-build Program Survey. In addition, those states that have completed at least one design-build project (<u>as of the end of calendar year 2002</u>) are asked to complete a Project Survey for a select sample of these projects. For comparative purposes, respondents are also asked to identify a similar design-bid-build project for each design-build project reported on, where available. Completion of a separate survey is requested for each of these comparable projects.

Survey Completion Process

The survey process is intended to be paperless to facilitate ease of completion, submittal, and tabulation of results. To this end, the Research Team[1] developed a website specifically for this study. The study website can be reach at the following address: http://construction.colorado.edu/design-build/.

This website provides public access to the following information:

• A description of this study;

• A virtual library of resource materials relating to design-build, including some that are accessible from the site in pdf format; and

• A listing of useful web sites on design-build, including state DOT websites.

Several activities on this website require a user name and password. This includes access to the following listings, which include the survey forms to be used by study participants:

• Design-build program contacts for each state participating in the SEP-14 Program (whether or not they have a design-build project completed prior to 2003).

• Sample of design-build projects for each state for which completed surveys are requested.

• Design-build program survey form.

• Project-specific survey form for design-build projects and design-bid-build projects.

The password limits access to the survey forms to those individuals designated to complete the surveys for each participating state.

Survey Instructions – Next Steps

The person identified as the primary point of contact for each agency's design-build program is being requested to complete the Program Survey on the website, following the instructions provided in an attached memo. We are also requested the state agency's Design-Build Program coordinator to assign individual staff to complete each of the project surveys, with one survey for each of the sample design-build projects listed and a comparable design-bid-build project that can be identified. Staff respondents should be those persons most familiar with these projects. Information and directions for designated survey respondents are also being sent to each participating state agency.

Both the Program Survey and the Project Survey can be completed by more than one person, if necessary, so long as all respondents are given user names and passwords. Additional user names and passwords can be established for your agency per your request by emailing Design-Build@construction.colorado.edu. These additional respondents will have the ability to view the Program Survey and edit the Project

[1] The research team for this effort consists of AECOM Consult, Inc. and the University of Colorado at Boulder's Construction Engineering & Management Program, working under a competitive open contract between SAIC, Inc. and FHWA.

Survey(s). The surveys are also designed to allow respondents to complete portions of the survey at different times, and then submit the completed survey when done. The website will let respondents know when the survey form is completed and ready for submission. ***All surveys should be completed and submitted on the designated website – we are requesting that respondents do not attempt to print out the survey forms, fill them out by hand, or mail them in.***

Please have all requested surveys completed and submitted to the study website on or before **Friday, November 21, 2003**. Thank you for your support in helping the Research Team assess the effectiveness of the design-build project delivery process in the Federal-Aid highway program. Thank you for encouraging agency staff to complete the program and project surveys on the study website. If you have any questions regarding the study or this request for assistance, please call either Dan Dornan (Study Project Manager) or me at the numbers listed below.

Sincerely,

Gerald Yakowenko, P.E.
FHWA Contract Administration Group
Office of Program Administration, HIPA-30

Daniel Dornan, P.E.
Research Team Project Manager
AECOM Consult, Inc.

E.3 Survey Instructions

To: State Transportation Agency Design-Build Program Coordinator

From: FHWA-Sponsored Design-Build Study Research Team

Date: October 2003

Re: **Instructions for Completing Survey(s) Relating to Design-Build Study for Congress**

Background Information

Two web-based surveys have been developed to streamline the data collection effort for this study: 1) Program Survey, and 2) Project Survey. To participate in the survey, users will need to register on the website. The Design-Build Study website (located at the University of Colorado at Boulder) is: http://construction.colorado.edu/design-build/. Use this website to login to the system and complete the appropriate survey(s), as well as to view details regarding the Design-Build Study for Congress and to access a vast array of design-build information. To login to the section of the website that contains the study surveys, use the unique ***user name*** and ***password*** provided to you in the e-mail message that conveyed this file.

User Profile Information

There are 2 types of respondents for this set of surveys.

1. **Adm** - The person who is the lead respondent for the agency, the Program Contact. This person can edit both the Program Survey and Project Survey(s) and is responsible for providing the Design-Build Study Team with names and email addresses for other persons within the agency who will complete the Project Survey(s).
2. **Usr** - A person designated by the Adm to complete one or more Project Surveys for his or her agency. This person can view both the Program Survey and Project Survey(s) for the agency as well as edit the agency's Project Survey(s) as designated by Adm. There may be multiple Usr respondents for each agency/project.

There are 2 features available to each respondent. The first feature allows for the respondent to edit their profile, including changing his or her password. This can be achieved once signed in to the system simply by clicking on the respondent's name on the right side of the screen between the banner and the main body of the web page. The second feature allows respondents who forget their password to receive an email with their password. Simply click on "Forget Password?" on the sign in screen, fill out the information requested, and the password will be sent to the respondent's email address.

Instructions for both the Program Survey and Project Survey are provided on the next page.

Please note: All surveys should be completed and submitted on the designated website - do not attempt to print out the survey forms, fill them out by hand, or mail them in. Please have all requested surveys completed and submitted to the study website on or before **Friday, November 21, 2003**.

Program Survey Instructions

1. Click on website address (noted above) to access system and files
2. Sign in to system using unique user name and password
3. Go to survey link
4. Select 'Proceed with Program Survey'
5. A program list will appear, find and click on your Agency
6. Fill out the survey. A 'save' function is available for use if you would like to complete the survey in more than one sitting; this is located at the bottom of the survey form.
7. Once you have completed the survey please select the 'Save' button.
8. A report indicating the percentage of the survey completed will appear. To view a detailed report select the 'Show Report' function. If the survey is 100 percent complete please select the 'Submit' button. Once the survey is submitted changes cannot be made without contacting the Research Team. If all of the information that is available is input into the survey and the survey is still not 100 percent complete, and therefore not able to be submitted, please contact the Research Team at: Design-Build@construction.colorado.edu.

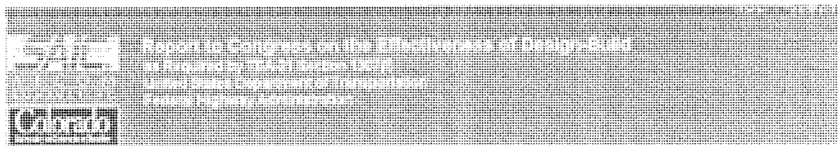
Project Survey Instructions

1. Click on website address (noted above) to access system and files
2. Sign in to system using unique user name and password
3. Go to survey link
4. Select 'Proceed to Project Survey'
5. The projects are listed by the state in which they are located. Each respondent will only be allowed to view the projects under their agency.
6. Each project survey can be viewed or edited.
   a. To view the survey click on the project name.
   b. To edit the survey you must check out the survey by clicking on the lock icon next to the project name. If you check a survey out please remember to return the survey when you are done editing. The survey can only be edited by one person at a time.
7. Fill out the survey. A 'save' function is available for use if you would like to complete the survey in more than one sitting; this is located at the bottom of the survey form.
8. Once you have completed the survey please select the 'Save' button.
9. A report indicating the percentage of the survey completed will appear. To view a detailed report select the 'Show Report' function. If the survey is 100 percent complete please select the 'Submit' button. Once the survey is submitted changes cannot be made without contacting the Research Team. If all of the information that is available is input into the survey and the survey is still not 100 percent complete, and therefore not able to be submitted, please contact the Research Team at: Design-Build@construction.colorado.edu.

All surveys should be completed and submitted on the designated website – please do not attempt to print out the survey forms, fill them out by hand, or mail them in.

We look forward to reviewing the information you and your colleagues provide and incorporating the results in the overall study effort and report to Congress, which will be distributed to respondents once authorized by FHWA. Thank you for your time and effort in support of this important study.

E.4 Survey Introduction



This **Design-Build Program Survey** requests information on the general nature and results of your agency's design-build program involving Federal-aid highway projects. The agency's designated design-build contact person should complete the Design-Build Program Survey.

The **Design-Build Project Survey** requests information on a sample of design-build projects completed by the end of 2002. A separate survey should be used for each of the projects that have been pre-selected by the SAIC/AECOM study team. For each design-build project reported on, we request that respondents also complete Part 2 of the survey form, which requires similar data for a comparable design-bid-build project (if there is one). By comparable we mean a project of similar type, size, and purpose. The individual(s) most familiar with the sampled design-build projects and comparable design-bid-build projects should complete a Design-Build Project Survey for each project reported on.

Please complete the surveys at the study web site. If required, a paper copy of the survey is available, but it will likely take more time to complete than the web survey. Please have the program or project cost data available before you begin the survey. The survey may be saved to complete a later time. If you have any questions regarding the study, please contact Study Team member Nathan Macek at nathan.macek@aecomconsult.com. Questions about the Web survey can be directed to Keith Molenaar at keith.molenaar@colorado.edu.

This page is intentionally blank.

E.5 Program Survey

PROGRAM SURVEY

State: **Liberty**
Agency: **Liberty Department of Transportation**

Respondent Information

First Name
Last Name
Email

Job Title
Organization
Phone 1
Phone 2
Fax
Address
Address (Cont.)
City
State
Zip Code * Enter a valid US zip code

Definition of Key Terms Used in the Survey

- **Design-Bid-Build (D-B-B)**: The traditional project delivery method in which design and construction are distinct, sequential steps in the project development process, subject to separate procurement approaches and processes.
- **Design-Build (D-B)**: A project delivery method in which the design and construction phases are contractually-integrated activities of the project development process. As used in this study, design-build includes the design and construction development stages. The term can also be used to encompass services in addition to design and construction, such as maintenance, operations, and finance (i.e., design-build-maintain, design-build-operate-maintain, and design-build-finance). Franchise and concession agreements are included in the term if they provide for the franchisee or concessionaire to develop the project that is the subject of the agreement.
- **Design-Builder**: The entity contractually responsible for delivering the project design and construction that holds the design-build contract with the owner.
- **Designer**: The lead professional design firm for the project.
- **Builder**: The lead general construction contractor for the project.
- **Subconsultant**: A designer that has a design subcontract with the lead design firm.
- **Subcontractor**: A construction firm that has a subcontract with the lead general contractor.
- **Contracting Agency**: Public agency awarding and administering a design-build contract. The contracting agency may be the State Transportation Agency or another state or local public agency.
- **ITS**: Intelligent Transportation Systems.

Agency Procurement Practices

1. How important are the following factors when making the decision whether or not to use the design-build project delivery approach:

Selection Criteria	Importance Unimportant: 1 Extremely: 6	
Cost of Project	1 2 3 4 5 6	N/A
Urgency of Project	1 2 3 4 5 6	N/A
Opportunity for Innovation	1 2 3 4 5 6	N/A
Opportunity for Appropriate Risk Transfer	1 2 3 4 5 6	N/A
Federal Program Initiative (SEP-14)	1 2 3 4 5 6	N/A
State Program Initiatives	1 2 3 4 5 6	N/A
Lack of In-House Resources	1 2 3 4 5 6	N/A
Quality	1 2 3 4 5 6	N/A
Other - Specify:	1 2 3 4 5 6	N/A

2a. Rate the following cost and non-cost factors relative to their importance in awarding design-build contracts:

Selection Criteria	Importance Least: 1					Most: 6	
Cost	1	2	3	4	5	6	N/A
Duration	1	2	3	4	5	6	N/A
Cost & Duration (A+B Contracts)	1	2	3	4	5	6	N/A
Quality Management Plan	1	2	3	4	5	6	N/A
Team Reputation (Past Performance)	1	2	3	4	5	6	N/A
Other:	1	2	3	4	5	6	N/A

2b. If factors other than cost are used for awarding of design-build projects, what is the average weighting of the cost factor? (%)

3. Is project prequalification generally required for design-build projects?

No

Yes, general or annual prequalification

Yes, one step, project specific prequalification

Yes, two step, project specific prequalification reduced to short list

Other?

4. Is there a minimum and/or a maximum percentage participation of total contract value typically required for the prime contractor on a design-build team?

No Yes

If yes, indicate percentages below:

(%) Maximum Percent

(%) Minimum Percent

Agency Design-Build Policies and Procedures

5. Did your agency require special permission or legislation to use design-build contracting?

No Yes

If yes, check which of the following changes were needed (check more than one category if applicable):

Special Legislation

Change in agency regulation

Other - specify:

6. Does your agency have written design-build contracting policies?

No Yes

If yes, did the development of design-build contracting policies and procedures precede the first design-build project?

No Yes

7. To what extent was the highway design/construction industry involved in developing the agency's design-build program?

None: 1	Significant:6					
1	2	3	4	5	6	N/A

8. Was any assistance provided to the highway design/construction industry to help them respond to design-build project opportunities?

No Yes N/A

If yes, check whichever applies:

Training workshops

Design-Build guidebook or manual

Stipends

Other - specify:

9. How adequate/appropriate are your agency's procedures and resources used for handling the procurement and contract administration of design-build projects:

Administrative Procedures/Resources	Rating Inadequate: 1 Adequate: 6
Procurement Procedures	1 2 3 4 5 6
Procurement Resources	1 2 3 4 5 6
Contract Administration Procedures	1 2 3 4 5 6
Contract Administration Resources	1 2 3 4 5 6

10. At what point in the design-build project delivery process does your agency typically verify compliance with the contract requirements and accept/reject the work? (check one):

As work progresses

At project's end

At warranty's end

Other - explain:

11. Is the agency's role in performing these quality assurance activities specified in the design-build contract?

No Yes

General Experience with Design-Build versus Design-Bid-Build Projects

12. Relative to design-bid-build contracting, how much agency administrative time (pre-award and post award) is typically required for design-build project? (indicate a positive or negative percentage change in agency administrative time relative to design-bid-build contracting):

Agency Project Administration	D-B Projects Relative to D-B-B Projects (%)
Procurement time	%
Contract administration time	%

13. Which group(s) are typically responsible for the following functions, for design-build projects and for design-bid-build projects, respectively? (check all that apply):

Risk/Responsibility Category	Design-Build Project		Design-Bid-Build Project		
	Owner	Design-Builder	Owner	Designer	Builder
Final Alignment Geometry					
Geotechnical Data					
Environmental Permits					
Design Criteria					
Design Defects					
Constructability of Design					
Obtaining ROW					
Coordinating with Utilities/Railroads					
Quality Assurance					

14. Which project stakeholder(s) are typically responsible for providing the following type of insurance for design-build projects, and for design-bid-build projects (check all that apply):

Type of Insurance	Design-Build	Project	Design-Bid-Build	Project
	Agency	Contractor	Agency	Contractor
Commercial General Liability				
Excess Liability				
Environmental Liability				
Workers' Comp./Employer's Liability				
Professional Liability				

Small Business Implications

15. In assessing the level and type of competition for design-build projects, provide your best estimate of the average number of teams/firms competing per project by project delivery approach below: (use N/A for Not Applicable or Not Available)

Dimension (average per project)	D-B Projects	D-B-B Projects
Average number of teams responding to RFQ per project		
Average number of teams responding to RFP per project		
Average percentage of project costs to be provided by small firms (%)		
Average number of local competing teams (led by local firms) per project		
Average percentage of project costs to be provided by small local firms on local competing teams (%)		
Average amount of stipends paid per team per project ($000s)		

* **Note:** Small business is defined as any organization with less than 500 employees and $6 million in average annual receipts for service organizations ($28.5 million for general building and heavy construction contractors and $12 million for special trade construction contractors) For applicable small business size standards by industry category, see the U.S. Small Business Administration's Small Business Size Regulations, 13 CFR §121 or the Table of Small Business Size Standards.

16. Have small businesses (engineering firms and construction contractors) been more or less involved in design-build projects versus design-bid-build projects? (check one for each category below):

Type of Insurance	**Rating** Less: 1					More: 6	
Involvement by small design firms:	1	2	3	4	5	6	N/A
Involvement by small contractors:	1	2	3	4	5	6	N/A

17. On average, are design-build companies and their subcontractors similar in size to those of similar design-bid-build projects?

No Yes

If no, how do they differ from design-bid-build teams? (check one for each category)

Design-Build Teams	**Rating** Smaller: 1					Larger: 6
Design-Build Contractor Size	1	2	3	4	5	6
Design-Build Subcontractor Size	1	2	3	4	5	6

The following questions seek information to characterize the nature and extent of your agency's Design-Build program

18. Please list the volume of design-build projects completed in the past fiscal year versus all capital projects for each project type:

Design-Build Project Volume	Highway			Bridge	Tunnel	ITS	Total
	New/ Realignment/ Widening	Rehabilitation/ Reconstruction	Resurfacing				
Number of D-B projects finished in the past fiscal year (#)							
Total costs of D-B projects finished in the past fiscal year ($000s)							
Number of all projects finished in past fiscal year (#)							
Total costs of all projects finished in past fiscal year ($000s)							

19. For each project type estimate the proportion (%) of all capital program costs that used each of the following project delivery approaches for projects completed during the past fiscal year: (each column should sum 100% or 0%)

Project Delivery Approach	Highway			Bridge	Tunnel	ITS
	New/ Realignment/ Widening	Rehabilitation/ Reconstruction	Resurfacing			
In-House (force account)						
Design-Bid-Build Contract						
Design-Bid-Build Warranty Contract						
Standard Design-Build Contract						
Design-Build Warranty Contract						
Design-Build-Operate-Maintain Contract						
D-B-Operate-Maintain-Finance Contract						
Performance-Based Asset Mgt. Contract						
Job Order Contracting (indefinite quantity)						
Other :						
Total All Projects (%) Calc	0%	0%	0%	0%	0%	0%

20. For each project type, estimate the proportion (%) of <u>design-build program</u> costs that used each of the following procurement approaches for projects completed during the past fiscal year: (each column should sum 100% or 0%)

Procurement Approach	Highway			Bridge	Tunnel	ITS
	New/ Realignment/ Widening	Rehabilitation/ Reconstruction	Resurfacing			
Low Bid						
Bid Averaging Method (BAM)						
Alternative Bids/Designs						
Request for Proposals						
Multi-Parameter Bidding, such as: Schedule, Cost-plus-time or Lane Rental, Traffic Control, Warranty, Warranty Credit, Quality Parameter						
Best-Value, such as: Adjusted Bid, Adjusted Score, Weighted Criteria, Cost-technical Tradeoff, Fixed Price-Best Design						
Total All Design-Build Projects Calc	0%	0%	0%	0%	0%	0%

21. For each project type estimate the proportion (%) of <u>design-build program</u> costs that used each of the following contract payment approaches for projects completed during the past fiscal year: (each column should sum 100% or 0%)

Contract Payment Approach	Highway			Bridge	Tunnel	ITS
	New/ Realignment/ Widening	Rehabilitation/ Reconstruction	Resurfacing			
Unit Price						
Cost Plus						
Lump Sum						
Time & Material						
Other – please specify:						
Total All Approaches Calc	0%	0%	0%	0%	0%	0%

22. Based on your agency's experience to date, indicate in general, how suitable certain types of highway projects are to design-build project delivery, versus design-bid-build project delivery?

Highway Widening/New Alignment	**Suitability** None: 1					Highly: 6	
Mega (>$100 million)	1	2	3	4	5	6	N/A
Large ($50-$100 million)	1	2	3	4	5	6	N/A
Medium ($10-$50 million)	1	2	3	4	5	6	N/A
Small ($2-$10 million)	1	2	3	4	5	6	N/A
Micro (<$2 million)	1	2	3	4	5	6	N/A

Highway Rehabilitation/ Reconstruction	**Suitability** None: 1					Highly: 6	
Mega (>$100 million)	1	2	3	4	5	6	N/A
Large ($50-$100 million)	1	2	3	4	5	6	N/A
Medium ($10-$50 million)	1	2	3	4	5	6	N/A
Small ($2-$10 million)	1	2	3	4	5	6	N/A
Micro (<$2 million)	1	2	3	4	5	6	N/A

Bridges/Tunnels	**Suitability** None: 1					Highly: 6	
Mega (>$100 million)	1	2	3	4	5	6	N/A
Large ($50-$100 million)	1	2	3	4	5	6	N/A
Medium ($10-$50 million)	1	2	3	4	5	6	N/A
Small ($2-$10 million)	1	2	3	4	5	6	N/A
Micro (<$2 million)	1	2	3	4	5	6	N/A

Highway Resurfacing	Suitability None: 1 Highly: 6						
Large (>$5 million)	1	2	3	4	5	6	N/A
Medium ($1-$5 million)	1	2	3	4	5	6	N/A
Small (<$1 million)	1	2	3	4	5	6	N/A

ITS	Suitability None: 1 Highly: 6						
Large (>$2 million)	1	2	3	4	5	6	N/A
Medium ($1-$2 million)	1	2	3	4	5	6	N/A
Small (<$1 million)	1	2	3	4	5	6	N/A

23. Indicate the degree to which your agency plans to use design-build project delivery in the future, by project type:

Project Type	Rating None: 1 Significantly : 6						
Highway new or widening	1	2	3	4	5	6	N/A
Highway rehabilitation	1	2	3	4	5	6	N/A
Pavement resurface	1	2	3	4	5	6	N/A
Bridge	1	2	3	4	5	6	N/A
Tunnel	1	2	3	4	5	6	N/A
ITS	1	2	3	4	5	6	N/A

24. What major changes have been made in the agency's design-build program to improve its effectiveness since its inception?

Have they accomplished their intended purpose? No
Yes Partially N/A

25. What major changes are planned in the agency's design-build program to improve its effectiveness in future years?

26. Other comments (Optional)

Save Cancel

E.6 Project Survey

Report to Congress on the Effectiveness of Design-Build
as Required by TEA-21 Section 1307(f)
United States Department of Transportation
Federal Highway Administration

Colorado

PROJECT SURVEY (Design-Build)

State:	Liberty
Agency:	Liberty Department of Transportation
Project	I-50 Liberty City Bridge Repair

Contact and Respondent Information

Primary Team Contact

First Name		
Last Name		
Email		
Job Title		
Organization		
Phone 1		
Phone 2		
Fax		
Address		
Address (Cont.)		
City		
State		
Zip Code		* Enter a valid US zip code

Respondent Information (Edit your personal information**)**

First Name	John

Last Name	Smith
Email	john.smith@dot.state.li.us
Job Title	
Organization	
Phone 1	
Phone 2	
Fax	
Address	
City	
State	
Zip Code	

Definition of Key Terms Used in the Survey

- **Design-Bid-Build (D-B-B)**: The traditional project delivery method in which design and construction are distinct, sequential steps in the project development process, subject to separate procurement approaches and processes.
- **Design-Build (D-B)**: A project delivery method in which the design and construction phases are contractually-integrated activities of the project development process. As used in this study, design-build includes the design and construction development stages. The term can also be used to encompass services in addition to design and construction, such as maintenance, operations, and finance (i.e., design-build-maintain, design-build-operate-maintain, and design-build-finance). Franchise and concession agreements are included in the term if they provide for the franchisee or concessionaire to develop the project that is the subject of the agreement.
- **Design-Builder**: The entity contractually responsible for delivering the project design and construction that holds the design-build contract with the owner.
- **Designer**: The lead professional design firm for the project.
- **Builder**: The lead general construction contractor for the project.
- **Subconsultant**: A designer that has a design subcontract with the lead design firm.
- **Subcontractor**: A construction firm that has a subcontract with the lead general contractor.
- **Contracting Agency**: Public agency awarding and administering a design-build contract. The contracting agency may be the State Transportation Agency or another state or local public agency.
- **ITS**: Intelligent Transportation Systems.

Project Specific Information

1. Project Specific Information

Project Name	I-50 Liberty City Bridge Repair
Project Location	
Project Team or Contractor	
Respondent Role in this project	Role of *John Smith*

2. Project Description

a. Facility Type (Estimate percentage of total project cost that falls into each category)	(%) Road (%)Bridge(s) (%)Tunnel(s) (%)HOV Lanes (%)ITS (%)Other:
b. Project Type (Estimate percentage of total project cost that falls into each category)	New Construction/Expansion % Rehabilitation/Reconstruction % Resurfacing/Renewal % Other: %
c. Highway Type (Estimate percentage of project cost that falls into each category)	Rural Interstate % Urban Interstate %

	Rural Primary		%
	Urban Primary		%
	Rural Secondary		%
	Urban Secondary		%
d. Project Size (Indicate dimensions)	Total Cost		($000s)
	Road Length		Lane-Miles
	Square Feet of Bridge Deck		Square Feet
	Maximum Bridge Height		Feet
	Number of Bridge Columns		(#)
	Other (ITS, etc.):		unit

3. Project Delivery Approach (Indicate approach used for this project)

- Design-Bid-Build
- Design-Bid-Build w/Warranty
- Design-Build
- Design-Build w/Warranty
- Design-Build-Operate-Maintain (DBOM)
- Design-Build-Operate-Maintain-Finance (DBOM-F)
- Performance-Based Total Asset Management
- Job Order Contract (Indefinite Delivery/ Indefine Quantity)
- In-House Agency Staff (i.e. force account)

Additional Commensts:

4. Procurement Approach (Indicate approach used for this project)

- Low Bid - no technical evaluation
- Bid Averaging Method (BAM)
- Request for Proposals w/Design Alternatives
- Multi-Parameter Bidding
  - Schedule
  - Lane Rental
  - Cost Plus Time (A+B)
  - Traffic Control
  - Warranty
  - Warranty Credit
  - Quality Parameter Measures within Percent Limits
  - Quality Parameter Measures within Performance Indicators

Best-Value, please review this link for definitions of the following terms

- Low Bid - Meets Technical Criteria
- Adjusted Bid
- Adjusted Score
- Weighted Criteria
- Cost-Technical Tradeoff
- Fixed Price - Best Design

5. Award Basis

- Competitive bid
- Negotiated award

6. Contract Type

- Fixed Price - Lump Sum
- Unit Price
- Cost Plus Fixed Fee
- Cost Plus Fixed Fee with Guarantee Maximum Price
- Other:

7. Use of Incentives or Disincentives

7a. Were incentive clauses used for this project?

No Yes

If "yes", indicate the kind of incentives used:

7b. Were disincentive or penalty clauses used for this project?

No Yes

If "yes", indicate the kind of disincentives or penalty clauses were used:

8. Extended Warranty Beyond Specified Minimum

a. Was any kind of warranty associated with the contract for this project?

No Yes

If "No", skip to question 9.

b. Type of warranty included in the project contract:

Material & workmanship

Performance or Condition

Other (indicate below):

c. Duration of warranty - after project completion, in years:

d. Escape clause criteria (specify which type(s) used in the contract):

Time limit

Cumulative axle loading

Other (indicate below):

e. Was the extended warranty a competitive factor in the selection process?

No Yes

f. Did the extended warranty increase or decress any of the following project attributes?

Project Duration	No	Yes; if "Yes", by what % (+ or -)
Project Quality	No	Yes; if "Yes", by what % (+ or -)
Project Cost	No	Yes; if "Yes", by what % (+ or -)

Additional Comments:

9. Project Team Organization

- Builder as prime
- Designer as prime
- Joint Venture
- Multi Prime/Multiple Prime Contracts
- Integrated design-builder
- Other:

10. Project Characteristics:

a. Primary project purpose:

b. Characterize the project according to the following criteria

Project Characteristics	Rating Low: 1					High: 6	
Degree of technical/engineering complexity	1	2	3	4	5	6	N/A
Degree of schedule urgency	1	2	3	4	5	6	N/A
Flexibility of project scope	1	2	3	4	5	6	N/A

c. What percentage of the following activities were complete when the design-build contract or the construction contract was issued for this project?

Activity	% Completed

Design: %

NEPA Clearance: %

Permit Clearance: %

Right-of-way Acquisition: %

d. Describe any unique feature about this project that significantly influenced any of the following project attributes:

Duration:

Cost:

Quality:

e. Was lifecycle costing taken into account during project conceptualization?

No Yes

If so, was it a factor in your agency's bid evaluation process? No Yes

Comments:

11. Specification Type

Specification Type	% of Total Specifications
Prescriptive	%
Performance	%

12. Prevailing Labor Environment (Complete all applicable portions - percentage refers to portion of total project costs):

Union State: (•) No ( ) Yes

Percent union involvement (%):

13. Contract Work Split (Complete as appropriate - percentage refers to portion of total project costs):

	Design (%):	Construction (%):	or, Combined (%):
Direct hire:			
Subcontracted:			

14. Competition (Complete as appropriate):

Number of responsive proposers/bidders:

Design

Construction

Design/Build

Additional Comments:

15. Duration Performance Metrics. Indicate the dates or characteristics for the following project delivery activities:

Activity	Dates	Units
Start RFP development		(mm/dd/yyyy)
Date project advertised		(mm/dd/yyyy)
Date RFPs submitted		(mm/dd/yyyy)
Date of Project Award		(mm/dd/yyyy)
Design initiation date		(mm/dd/yyyy)
Construction initiation date		(mm/dd/yyyy)
Planned project acceptance date		(mm/dd/yyyy)

Actual project acceptance date		(mm/dd/yyyy)
Number of liquidated damages days		days

Project Velocity - average per month:

Lane-miles completed		Lane mile/month
Square feet of bridge deck completed		sq ft deck/month
Project cost spent		$000s/month

16. Cost Performance Metrics. Indicate the planned and actual costs (in thousands of dollars) for the following project delivery activities:

Project Development Stage	Agency PE Cost/ RFP Cost	Design-Builder Design Costs	Design-Builder Construction Costs	Agency Contract Administration and Inspections Costs	Total Project Costs
At Budget (Engineer's estimate)					
At Contract Award					
At Final Cost					

b. Indicate the reasons for major changes in project costs:

	Rating None: 1					Major: 6	
Owner required additions or subtractions	1	2	3	4	5	6	N/A
Design-Builder or Contractor suggested additions or subtractions	1	2	3	4	5	6	N/A
Events not controllable by sponsor or contractor (weather, etc.)	1	2	3	4	5	6	N/A
Poor design	1	2	3	4	5	6	N/A
Differing site conditions	1	2	3	4	5	6	N/A
Unit price adjustment clauses	1	2	3	4	5	6	N/A
Sponsor delays (environmental clearance, land acquisition)	1	2	3	4	5	6	N/A
Contractor delays (design, environmental clearance, land acquisition, construction, inspection approval)	1	2	3	4	5	6	N/A

Third party additions or subtractions 1 2 3 4 5 6 N/A

Third party delays 1 2 3 4 5 6 N/A

Other: 1 2 3 4 5 6 N/A

c. Indicate the number and total cumulative value of all **change orders/extra work orders** for this project:

Number of approved change/extra work orders — Number

Cumulative net value of approved change/extra work orders — ($000s)

d. Indicate the number and total cumulative value of all **claims** for this projects:

Number of approved claims — Number

Cumulative net value of approved claims — ($000s)

e. Indicate the amount (value) of **any re-work** required after the project was accepted by the owner (re-work means additional work required to correct deficiencies that appear after the project is put into service as a result of design or construction errors):

Within 1 year — ($000s)

Beyond 1 year — ($000s)

17. Quality Performance Metrics

a. List the success criteria used for this project by the agency and the relative performance acheived:

b. Indicate the overall quality results for this project:

Quality Criteria	Rating Poor: 1 Superior: 6						
Conformance with standards/specifications	1	2	3	4	5	6	N/A
Compliance with warranty provisions	1	2	3	4	5	6	N/A
Overall sponsor satisfaction	1	2	3	4	5	6	N/A

c. Characterize the prior experience/expertise of the key stakeholders of this project with the project development approach used (check whichever boxes apply, with one box checked per row):

Stakeholder Group	Prior Experience None: 1 Excellent: 6						
Agency/Owner	1	2	3	4	5	6	N/A
Design-Builder	1	2	3	4	5	6	N/A
Designer	1	2	3	4	5	6	N/A
Builder/Constructor	1	2	3	4	5	6	N/A
Subconsultant(s)	1	2	3	4	5	6	N/A
Subcontractor(s)	1	2	3	4	5	6	N/A
Finance (bond underwriter)	1	2	3	4	5	6	N/A
Insurance (surety vendor)	1	2	3	4	5	6	N/A

18. Lessons Learned from this project:

a. Did the project fulfill its intended purpose?

No Yes

If "No", in what way(s)

b. Did the project delivery approach significantly impact the outcome of the project in fulfilling its intended purpose?

No Yes

If "Yes", in what way(s)

c. For design-build projects only, how did the following performance criteria change because of using the design-build delivery approach? (Indicate positive (+) percentage for increase, negative (-) percentage for decrease, zero (0) percent for no change)

Project Performance Criteria	Value (+% or -%)
Duration	%
Cost	%
Quality	%

d. Lessons learned from the project regarding the delivery approach used?

e. Could this project have been delivered more successfully, based on what you now know about the delivery approach used?

No Yes Unclear

If "Yes", explain how:

Additional Comments:

Save Cancel

APPENDIX F

REVIEW OF COMPLETED SEP-14 PROJECT EVALUATION REPORTS

The review of completed SEP-14 project evaluation reports process was used to structure design-build study survey questions and confirm the applicability of data requested. The review used available information from SEP-14 reports, the SEP-14 project database, and design-build project evaluation reports. The sample size was limited by the availability of comparable information—only 33 projects in 15 states were documented.

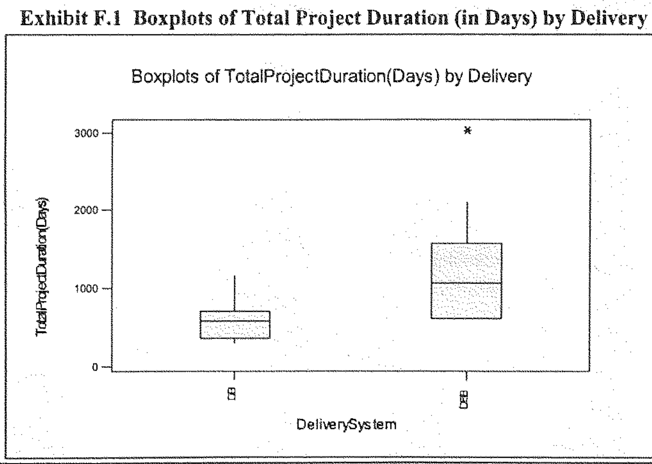
SEP-14 project evaluation reports provide a glimpse into the kinds of information state DOT sponsors are most likely to have and share, hence the need to be cognizant of this information when formulating study surveys. The reports suggest a variety in how SEP-14 projects are executed and documented, and demonstrate a need for a consistent reporting basis for analysis & determination of results.

Completed project evaluation reports do not provide an adequate basis for assessing design-build impacts on projects or industry, so a larger sample of completed projects uniformly reported on is required, as well as a program-level assessment. This study addresses these concerns and provides a wealth of useful information to developers and implementers of design-build projects, with the full cooperation and assistance of STD design-build program managers and project leaders.

Preliminary Results

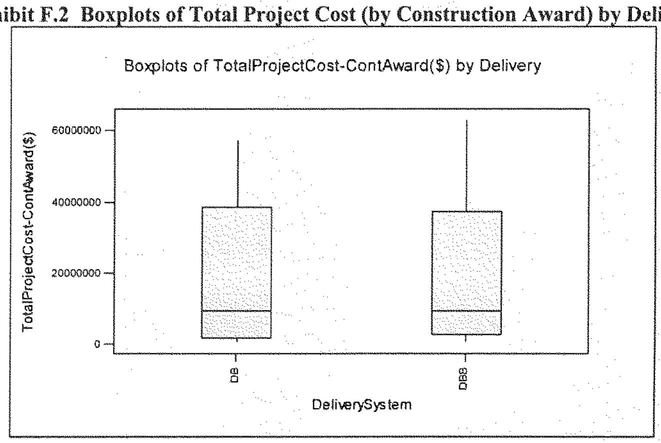
With 14 available observations, the review found that there was significant difference in the mean project duration between design-build and design-bid-build projects. The average duration is 583 days for design-build, compared to 1,215 days for design-bid-build. This is illustrated in Exhibit F.1.

Exhibit F.1 Boxplots of Total Project Duration (in Days) by Delivery



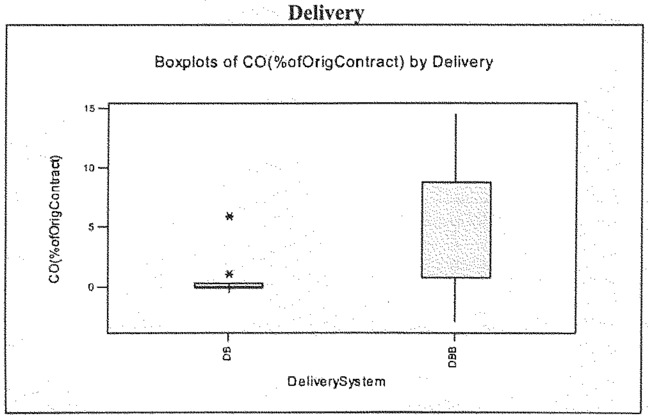
With six available observations, the review found no significant difference in mean cost between design-build and design-bid-build projects. The average project cost was $18.4 million for design-build projects, and $18.9 million for design-bid-build. This is shown in Exhibit F.2.

Exhibit F.2 Boxplots of Total Project Cost (by Construction Award) by Delivery



With 10 available observations, the review found significant differences in the additional project cost per change order. The difference was 0.6% of project costs for design-build projects compared to 6.0 percent for design-bid-build projects. This is illustrated in Exhibit F.3.

Exhibit F.3 Boxplots of Change Orders (As Percentage of Original Contract Costs) by Delivery



Conclusions

Only about 10% of the design-build project evaluation reports required by FHWA were submitted. Completed reports were prepared by persons familiar with projects, and most of the reports submitted were of high quality. However, the reports lack consistency in structure, contents, format, and terminology, and the sample size is not statistically significant for the population of design-build projects. These issues demonstrate the need to conduct the full design-build study program and project surveys.

List of SEP-14 Project Evaluation Reports

State
Number of projects approved/if evaluations found and number

1. Evaluations that are in possession of team at University of Colorado-Boulder

- Comments from Researcher Jennifer Shane, University of Colorado-Boulder
    A. Evaluations that are indicated on FHWA Design-Build Project Approvals under SEP-14 as of 12/31/2002 (http://www.fhwa.dot.gov/programadmin/contracts/sep14a.htm)

Alabama
1 Project Approved/No Evaluations Found

Alaska
4 Projects Approved/No Evaluations Found

A. *Dated 13-Apr-99 for Ocean Class Ferry Boat*
B. *Dated 01-Mar-99 for Whittier Tunnel*

Arizona
6 Projects Approved/Several Evaluations Found

1. Evaluation of the Design-Build Delivery Process for A State Department of Transportation Pilot Project. James Ernzen, Craig Albelda, Kraig Knutson. Construction Congress VI, Reston Virginia, 2000.
2. Arizona's new Design-Build Law and Experience to Date. Arizona Department of Transportation, 1998.
3. 3 Masters Thesis-In Transit
    A. *Dated 29-Mar-02 for I17 Thomas Road to Dunlap Avenue, Phoenix*

Arkansas
No Projects Approved

California
4 Projects Approved/No Evaluations Found

A. *Dated 25-May-94, 01-Oct-94 for Emergency Relief-LaCienega/Venice Undercrossing*

Colorado

6 Projects Approved/3 Evaluations Found

1. Evaluation of Design-Build Practice in Colorado Project IR IM(CX) 025-3(113). Pete Graham, March 2001.
2. Evaluation of Design Build Practice in Colorado IR(CX)70-4(143). Ahmad Ardain, Paul Jesaitisl July 1999.
3. Evaluation of Design Build Practice in Colorado IR(CX)70-4(143). Ahmad Ardain, Bernnie Guevara, William Sccheuerman, November 1997.
4. Interstate 25 and 225 Transportation Expansion Project (T-REX): Special Experimental Project 14 Initial Report. January 15, 2002.
   - *Numbers 2 and 3 are on the same project, one addresses pre-construction activities and the other summarizes all activities.*
     A. *Dated 15-Jan-02 for Southeast Corridor Denver I-25*

Connecticut

No Projects Approved

Delaware

1 Project Approved/No Evaluations Found

A. *Dated 28-Aug-02 for Choptank Road over Back Creek*

Florida

67 Projects Approved/3 Evaluations Found

1. State of the Practice Review in Design-Build. Florida DOT, 2002.
   - *Included in this review is an overview of design-build practices in South Carolina and Arizona but there is very little information regarding Florida's use of design-build.*
2. Final Evaluation of the Florida Department of Transportation's Pilot Design/Build Program. Ralph D. Ellis, Jr, Ashis Kumar. Transportation Research Record 1351, 1992.
   - Many cost and schedule numbers appear to be available.
3. Evaluation of the FDOT Design/Build Program. Ralph Ellis, Zohar Herbsman, Ashish Kumar. University of Florida, August 1991.
   - This may contain much of the same information as the item listed in Florida 2.

Georgia

8 Projects Approved/No Evaluations Found

Hawaii

1 Project Approved/No Evaluations Found

Idaho

No Projects Approved

Illinois

No Projects Approved

1. 2002 Survey by SAIC for Illinois DOT on the Current Use of Design-Build.
   - *This survey was completed by several states but does not include many hard data.*

Indiana
8 Projects Approved/1 Evaluation Found

1. An Initial Evaluation of Design-Build Highway Projects Performed by Indiana Department of Transportation. Nicholas Tymvois, Bobby G. McCullouch, Kumares C. Sinha. Purdue University, September 2002.

Iowa
No Projects Approved

Kansas
No Projects Approved

Kentucky
No Projects Approved

Louisiana
1 Project Approved/No Evaluations Found

Maine
2 Projects Approved/3 Evaluations Found

1. Design-Build-Warranty in Maine: The Bath-Woolwich Bridge Project Mid Year 1998 Report. Bruce A. Van Note.
2. Practical Considerations for Design-Build: The Bath-Woolwich , Maine Design-Build-Warranty Bridge Project. Bruce A. Van Note, 1998.
3. Maine Develops Unique Design-Build Selection Process for Bath-Woolwich Bridge Project. Alan R. Phips, 1999.
   - *These may contain relatively the same information.*
     A. *Dated 11-Dec-01 for Bath-Woolwich Bridge Replacement*

Maryland
9 Projects Approved/No Evaluations Found

Massachusetts
1 Project Approved/No Evaluations Found

A. *Dated 15-Oct-00 for Route 3 North from Route 128 to the NH border*

Michigan
21 Projects Approved/No Evaluations Found

A. Dated 26-Nov-96 (To FHWA on 20-Mar-97) for Detroit Freeway Management System ATMS/ATIS

Minnesota
2 Projects Approved/No Evaluations Found

Mississippi
No Projects Approved

Missouri
No Projects Approved

Montana
No Projects Approved

Nebraska
No Projects Approved

Nevada
1 Project Approved/No Evaluations Found

New Hampshire
No Projects Approved

New Jersey
12 Projects Approved/3 Evaluations Found

1. New Jersey's Modified Design/Build Program Progress Report 6. August 11, 1999.
2. New Jersey's Modified Design-Build Program-Part I Progress Report 4. 1998.
3. New Jersey's Modified Design-Build Program Initial Progress Report. 1996.
   - *I have contacted the Library for the New Jersey DOT about other reports but I have not received anything from them.*
     A. There should be more but am unable to obtain them (Progress Reports 2, 3, 5, >6)

New Mexico
2 Projects Approved/No Evaluations Found

A. *Dated 28-Feb-03 for US 70 in Hondo Valley, Ruidoso Downs to Riverside and NM 528 Bernalillo and Sandoval Counties*

New York
3 Projects Approved/No Evaluations Found

1. Design-Build Practice Report. Parsons Brinkcerhoff Quade & Douglas, Inc. August 2002.
   - *This is essentially a survey of the current practices in many states, not including NY.*

North Carolina
7 Projects Approved/1 Evaluation Found

1. CARAT-An Operational Test of Design-Build-Warrant Procurement for ITS Deployment, Evaluation Report of Phase 1 Procurement, Chapter 1. The HNTB Companies, 1997.
2. CARAT-An Operational Test of Design-Build-Warrant Procurement for ITS Deployment, Evaluation Report of Phase 1 Procurement, Chapter 2. The HNTB Companies, 1997.
3. CARAT-An Operational Test of Design-Build-Warrant Procurement for ITS Deployment, Evaluation Report of Phase 1 Procurement, Chapter 4. The HNTB Companies, 1997.
   A. *Dated 01-Apr-97 for Carat ITS Project*
   B. *01-Sep-00 Statewide Wetland Mitigations*

North Dakota
No Projects Approved

Ohio
52 Projects Approved/2 Evaluations Found

1. Final Report: Six-State Survey of Construction Administration Practices and Procedures. Ohio Department of Transportation and Trauner Consulting Services, Inc.
   - *This report appears to compare the DB experiences of ADOT, FDOT, MDOT, WSDOT, and WisDOT but may not offer much in the way of useful information.*
2. ODOT Experience on Six Pilot Design-Build Projects: Interim Report. Ohio DOT. January 29, 1999.
   - *Initial (letting) cost are given, however, there is little to no final cost information readily available.*
   - Walid E. Gemayel, P.E., Deputy Director, Division of Construction Management, has been contacted to see if there is any other information available.
      A. *Dated 31-Oct-00 for Van-US 127, ALL-IRO75, LOR-IRO90, MED-IR271, ATB-SR045, STA-IR077, GUE-SR660, MIA-IR075, PRE-IR070, GRE-US35J, HAM-IR071, HAM-IR275, HAM-IR471, ROS-SR159, NOB-IR077, CUY-IR480*

Oklahoma
No Projects Approved

Oregon
2 Projects Approved/5 Evaluations Found

1. Design Build Contracting in the Oregon Department of Transportation. Masters Thesis by Francico O. Simas. November 1998, Oregon State University.
   - *I don't know that this contains any useful information about the actual work on the project of if it is just an over view of the RFQ/RFP process and some lessons learned to date.*
2. *ODOT Design-Build Pilot Projects Evaluation for Evans Creek-Rock Point Design-Build Pilot Project. David F. Rogge, Rodolfo Pinto, Darrell Gobble. 2001, Oregon State University.*
3. *ODOT Design-Build Pilot Projects Evaluation Volume I. David F. Rogge, 2001.*
4. *ODOT Design-Build Pilot Projects Evaluation Volume II. David F. Rogge, 2001.*
5. *ODOT Design-Build Pilot Projects Evaluation Volume III. David F. Rogge, 2001.*
   - *Reports 2-5 may contain the same information.*

Pennsylvania
52 Projects Approved/2 Evaluations Found

1. Initial/Interim Report on Design/Build. 2000.
2. Initial/Interim/Final Report Modified Turnkey (Design/Build) Suquehana County. 1999.
      A. *Dated 27-Mar-01 for District 1 Warren Co. Expressway Reconstruction*
      B. *Dated 11-Jan-02 for District 4-0 Susquehanna 0011-573 Bridge Replacement Hallstead/Great Bend*
      C. *Dated 07-Jun-01 District 11 Beaver Count 1022-B02 13th Street Blockhouse Run Bridge*

Rhode Island
No Projects Approved

South Carolina
8 Projects Approved/1 Evaluations Found

1. Initial Report for SEP 14 Design-Build Contract for the Replacement of US 601 South Bound Bridge over the Wateree River. 1997.
    A. *Dated 03-Sep-96 for Bridge Replacements-Reedy Creek, Enoree River*

South Dakota
1 Project Approved/3 Evaluations Found

1. Design/Build-Lessons Learned to Date. Lawrence L. Weiss. October 7, 2000.
2. Design/Build-Interim Report and Additional Lessons Learned. Lawrence L. Weiss. February 28, 2001.
3. Design/Build-Additional Lessons Learned to Date. Lawrence L. Weiss. February 25, 2003.
    - *These appear to be all on the same project and may contain basically the same information.*

Tennessee
1 Project Approved/No Evaluations Found

Texas
1 Project Approved/1 Report Found

1. Design-Build Contracting for Highway Construction Projects in Texas. Douglas D. Gransberg, Jason Valerius, Sanjaya Senadheera, Mustaque Rumi. Texas Tech University, September 1997.
    A. *Dated 04-Feb-02 for Texas Turnpike Authority US183A and SH130*

Utah
8 Projects Approved/5 Evaluations Found

1. I-15 Corridor Reconstruction Project Design/Build Evaluation 2000 Annual Report.
2. I-15 Corridor Reconstruction Project Design/Build Evaluation 1999 Annual Report.
3. I-15 Corridor Reconstruction Project 1998 Annual Report.
4. I-15 Corridor Reconstruction Project Initial Report. 1997.
5. Utah Department of Transportation I-15 Case Study. Masters Report by Donna Kimball. July 11, 1999.
    A. Dated 01-Dec-97 and 30-Sep-99 for ITS Traffic Operations Center Project
    B. *Dated 01-Jun-97 and 30-Mar-99 for ITS Interim Traffic Control System*
    C. *Dated 01-Nov-99 for SR-176 Lake Powell vehicle/passenger ferry system*

Vermont
1 Project Approved/No Evaluations Found

Virginia
7 Projects Approved/No Evaluation Found

A. *Dated 01-Nov-01 for Route 288 (I-64/288 Interchange and I-64 to Rt. 250 Connection)*

Washington
3 Projects Approved/2 Evaluations Found

1. Washington State Department of Transportation Design-Build Pilot Project Evaluation. Keith Molenaar, Justin Sencer, Jamal Parker, Travis Stewart, Brian Saller, Steve Coggins, Colleen Butler. University of Colorado and WSDOT, 2003.
2. Washington State Department of Transportation Design-Build Pilot Project Evaluation: Interim Report-POQ/BAFP. Keith Molenaar.
   - These may contain the same information.

West Virginia
No Projects Approved

Wisconsin
1 Project Approved/No Evaluations Found

A. *Dated 20-Aug-02 for City of Milwaukee, Menominee Valley Viaduct*

Wyoming
No Projects Approved

APPENDIX G

BIBLIOGRAPHY

This appendix presents a summary of the literature search undertaken as part of this study. The contents of this interim document are derived from the website developed by the AECOM Consult Team and posted at http://construction.colorado.edu/Design-Build. The Design-Build website contains five major sections briefly described below:

- **Home Page** – presents the background, goal, objectives, and scope of the study, including a brief overview of the study effort.
- **Project Page** – describes the methodology, work plan, and project team structure for the study.
- **Literature Page** – presents a bibliography of all reference documents obtained during the literature search, alphabetically organized by type of document.
- **Library Page** – provides a searchable listing of all reference documents contained in the literature database, complete with direct links to web-posted documents and pdf files where available.
- **Useful Links Page** - contains links to various design-build web sites as well as links to each state transportation agency's web site.

Members of the design-build community and the general public are welcome to visit the Design-Build website at http://construction.colorado.edu/Design-Build. To enable full access to the site, visitors must register using the "register" link from the Home Page. Upon registration, users will receive email notification of their User ID and Password in order to successfully login to the website. As registered members of the site, users will have full access to all links and all documents that are not copyright protected. In addition, registered members may contribute additional documents to the site and provide commentary on any documents contained in the library.

New documents may be posted to this website by registered members by clicking on the "Upload Documents" text on the left-hand side of the Library Page. General information regarding a piece of literature as well as an abstract may be typed into the Upload box and automatically uploaded to the website. The Library Page also supports posting PDF and Microsoft Word versions of documents to the site.

Following completion of this research study, this website will continue to be hosted by the University of Colorado at Boulder as a continuing resource for members of the design-build community.

The up-to-date contents of the Literature page represent the bibliography that follows. For a more complete indication of the contents of this database, including reference documents accessible from the Library page, please use the referenced website address to visit the site directly at http://construction.colorado.edu/Design-Build and access the resident documents.

Books

Beard, Jeffrey L.; Loulakis, Michael C. Sr.; Wundram, Edward C. (2001). Design Build: Planning Through Development, McGraw-Hill

Book Chapters

Branca, Anthony J. (1988).'Cost Effective Design/Build Construction'. McGraw-Hill

Cushman, R.; Taub, K. (1992).'Design-Build Contracting Handbook'. Wiley

Quatman, W. (2000).'Design-Build for the Design Professional'. Aspen Publishing, Inc.

Molenaar, K.; Scott, S. (2003).'Examining the Performance of Design-Build in the Public Sector'. Aspen Law and Business

Beard, J. L. (2003).'Procurement and Delivery Systems in the Public Sector: History and Perspective'. Aspen Publishers

Twomey, Timothy R. (1989).'Understanding the Legal Aspects of Design/Build'. R.S. Means Co.

Guidelines

The American Institute of Architects and Associated General Contractors of America .'AIA/AGC Recommended Guidelines for Procurement of Design-Build Projects in the Public Sector'. The American Institute of Architects and Associated General Contractors of America, 1-13. Washington, D.C.

Florida Department of Transportation (1997).'Alternative Contracting User's Guide Draft'. Florida Department of Transportation, 1-97. Florida

Arizona Department of Transportation.'Arizona Department of Transportation Design-Build Procurement & Administration Policy'. Arizona Department of Transportation, 1-14.

Colorado Department of Transportation (1996).'Colorado Department of Transportation Design-Build Guidelines'. Colorado Department of Transportation, 1-14. Colorado

Trauner Consulting Services Inc. (1996).'Criteria and Guidelines for Innovative Contracting'. South Dakota Department of Transportation, 1-10. Philadelphia, PA

Georgia Department of Transportation (1999).'Department of Transportation State of Georgia Special Provision'. Georgia Department of Transportation, 1-16.

Colorado Department of Transportation (1997).'Design-Build Guidelines'. Colorado Department of Transportation, 1-19. Colorado

Ohio Department of Transportation (1996).'Design-Build Pilot Program'. Ohio Department of Transportation, 1-10. Ohio

Washington State Department of Transportation (1999).'Design-Build Process for Highway Projects'. Washington State Department of Transportation, 1-120. Washington

Washington State Department of Transportation (2001).'Guidebook for Design-Build Highway Project

Development'. Washington State Department of Transportation, 1-378. Washington

Colorado Department of Transportation (1997).'Implementation of Design-Build Guidelines & Design-Build Manual'. Colorado Department of Transportation, 1-19. Colorado

Maricopa County, Arizona (1996).'Maricopa County Arizona Design-Build Manual'. Maricopa County, Arizona, 1-47.

Sheehan, Terrance M.; Volpe, John A. (1996).'National Transportation Systems Center, Turnkey Evaluation Guidelines'. USDOT, Federal Transit Administration Turnkey Demonstration Program.

Ohio Legislature .'Ohio Revised Code Section 5517.011: Pilot Program for Combining Design and Construction Elements of Projects into Single Contract'. . Columbus, OH

Georgia Department of Transportation (2001).'Policy and Procedure Statement Governing the Qualifications of Professional Consultants to Perform Work for the State of Georgia DOT'. Georgia Department of Transportation, 1-43. Georgia

Smith, Robert J. (1987).'Recommended Competitive Bidding Procedures for Construction Projects'. Engineers Joint Contract Documents Committee, 1-19.

J urnal Articles

Ndekugri, Issaka; Turner, Adrian (1994).'Building Procurement by Design and Build Approach'. Journal of Construction Engineering and Management 120(2)

Gordon, Christopher M. (1994).'Choosing Appropriate Construction Contracting Method'. Journal of Construction Engineering and Management 120(1)

Konchar, Mark and Sanvido, Victor (1998).'Comparison of U.S. Project Delivery Systems'. Journal of Construction Engineering and Management, American Society of Civil Engineers 124(6), 435-444

Chan, Albert P.C.; Ho, Danny C.K.; Tam, C.M. (2001).'Design and Build Project Success Factors: Multivariate Analysis'. Journal of Transportation Engineering 127(2), 93-100

Akintoye, Akintola (1994).'Design and Build: A Survey of Construction Contractors' Views'. Construction Management and Economics 12(2)

Gransberg, Douglas D.; Senadheera, Sanjaya P. (1999).'Design-Build Contract Award Methods for Transportation Projects'. Journal of Transportation Engineering 125(6), 565-567

Gransberg, Douglas D.; Villarreal-Buitrago, Monica E. (2002). 'Construction Project Performance Metrics'. AACE International Transactions, CSC.02. AACE International.

Roberts, Kenneth M.; Smith, Nancy C. (1996).'Design-Build Contracts Under State and Local Procurement Laws'. , Public Contract Law Journal 25(4), 526-709

Potter, Kevin J.; Sanvido, Victor E. (1994).'Design-Build Prequalification System'. Management in Engineering 10(2)

Molenaar, Keith R.; Gransberg, Douglas D. (2001).'Design-Builder Selection for Small Highway Projects'. Journal of Management in Engineering, ASCE 17(4), 214-223

Rizzo, Jack (1998).'Design/Build Alternative: A Contracting Method'. Journal of Management in Engineering 14(6), 44-47

Gransberg, Douglas D. (2003).'Design/Build in Transportation from the Research Perspective'. Leadership and Management in Engineering, ASCE 3(3), 133-136

Friedlander, Mark C. (1998).'Design/Build Solutions'. Journal of Management in Engineering 14(6), 59-64

Clarke, Richard F. (2003).'Early Planning and Decisions on the Southeast Corridor Project'. Leadership and Management in Engineering, ASCE 3(3), 142-144

Toussant, Jeffrey P. (2003).'Environmental Impacts to Design/Build Projects-A Case Study of the St. George Island Bridge Replacement, Apalachicola Bay, Florida'. Leadership and Management in Engineering, ASCE 3(3)

Chan, Albert P.C.; Scott, David; Lam, Edmond W.M. (2002).'Framework of Success Criteria for Design/Build Projects'. Journal of Management in Engineering 18(3), 120-128

Potter, Kevin J.; Sanvido, Victor (1995).'Implementing a Design/Build Prequalification System'. Management in Engineering 11(3)

Transportation Research Board (1991).'Innovative Contracting Practices'. Transportation Research Circular, Transportation Research Board 386, 1-67

Shah, Jay B. (1996).'Innovative Design/Build Approach: Ambassador Bridge Project'. Journal of Management in Engineering

Pain, James; Bennett, John (1988).'JCT with Contractor's Form of Contract: A Study in Use'. Construction Management and Economics 6

Rahman, Suhel P.; Anderson, Stuart D.; Russell, Jeffrey S.; Smith, Robert J.; Hogue, Laura Y. .'Multi-Parameter Bidding Method: Development of Parameters'. , 1-18

ENR (2002).'North Carolina's First Crack at Design-Build Paves the Way'. Engineering News-Record, McGraw-Hill, 1

Allen, Linda N.; Gransberg, Douglas D.; and Molenaar, Keith R. (2002).'Partnering D-B Contracts'. The Military Engineer(616), 47-48

American Association of State Highway and Transportation Officials (1997).'Primer on Contracting 2000'. , American Association of State Highway and Transportation Officials, 1-37

Songer, Anthony D. (1994).'Process Model for Public Sector Design-Build Planning'. Journal of construction Engineering and Management 120(4)

Songer, Anthony D.; Molenaar, Keith R. (1997).'Project Characteristics for Successful Public-Sector Design-Build'. Journal of Construction Engineering and Management 123(1), 34-40

Molenaar, Keith; Songer, Anthony D.; and Barash, Mouji (1999).'Public-Sector Design/Build Evolution and Performance'. Journal of Management in Engineering , American Society of Civil Engineers 15(2), 54-62

Molenaar, Keith R.; Songer, Anthony D.; Barash, Mouji (1999).'Public-Sector Design/Build Evolution and Performance'. Journal of Management in Engineering 15(2), 54-62

Songer, Anthony and Molenaar, Keith (1996).'Selecting Design-Build: Public and Private Sector Owner Attitudes'. Journal of Management in Engineering, American Society of Civil Engineers 12(6), 47-53

Eaton, David; O'Connor, Charmaine; and Turner, Andy (2002).'Selecting PFI/DFBO: Roads to the Future? Do PFI/DBFO Schemes Promote Good Quality Performance?'. Journal of Structured and Project Finance, Institutional Investor, Inc., 53-63

Songer, Anthony D.; Molenaar, Keith R.; Robinson, G. (1996).'Selection Factors and Success Criteria for Design-Build in the U.S. and U.K.'. International Journal of Construction Procurement 2(2), 69-82

Flyvbjerg, Bent; Skamris Holm, Matte K.; Buhl, Soren L. (2002).'Underestimating Costs in Public Works Projects Error or Lie?'. , Journal of the American Planning Association 68(3), 279-295

Yates, J. K. (1995).'Use of Design/Build in E/C Industry'. Journal of Management in Engineering 11(6)

Nelson, Roy O. (1997).'Utah's I-15 Design-Build Project'. Public Roads Online, US DOT Federal Highway Administration, 6

Others

* (1996).'50 State Survey of Public Agency Design-Build Authority'.

Hovatter, Mark H. (1993).'A Study of Design-Build Construction and Its Place in Public Contracts'. University of Florida

Mouritsen, John W. (1993).'An Empirical Analysis of the Effectiveness of Design-Build Construction Contracts'. Purdue University

Molenaar, Keith R. (1995).'Appropriate Project characteristics for Public Sector Design-Build Projects'. University of Colorado at Boulder

US DOT Federal Highway Administration (2002).'BRIEFING: FHWA Initiatives to Encourage Quality Through Innovative Contracting Practices SEP-14', http://www.fhwa.dot.gov/programadmin/contracts/sep a.htm.

US DOT Federal Highway Administration (2002). Design-Build Project Approvals under SEP-14 as of 12/31/2002, http://www.fhwa.dot.gov/programadmin/contracts/sep14a.htm.

Theberge, Paul E. (1998).'Construction Management Aspects of Florida DOT's Innovative and Alternative Contracting Procedures'. Florida Department of Transportation

Ernzen, Jim and Feeney, Tom (2002).'Contractor Led Quality Control & Quality Assurance Plus Design Build: Who Is Watching the Quality?'. Transportation Research Board

Kelsey, Mark (1999).'Design-Build in Ohio'. Ohio Department of Transportation

Minden, Stephen B. (1986).'Design-Build in the Public Sector: A Case Study of Massachusetts Division of Capital Planning and Operations (DCPO)'. Massachusetts Institute of Technology

Arizona Department of Transportation (1995).'I-17 Request for Approval Innovative Contracting Practices'. Arizona Department of Transportation

Colorado Department of Transportation (1996).'I-70 & I-225 NW Flyover Project Summary'. Colorado Department of Transportation

Utah Technology Transfer Center .'Implementation: Design-Build Best Practices Guide'. Utah State University

Florida Department of Transportation (1996).'Innovative and Alternative Contracting Practices'. Florida

Department of Transportation

Michigan Department of Transportation (*).'Michigan Design-Build Presentation'. Michigan Department of Transportation

Missouri Legislature (2002).'Missouri SB 0970: Provides for Design-Build'.

Utah Technology Transfer Center .'Overview: Design-Build Best Practices Guide'. Utah State University

Scheinberg, Phyllis F. (1997).'Prospects for Innovation Through Research, Intelligent Transportation Systems, State Infrastructure Banks, and Design-Build Contracting'. US General Accounting Office

Colorado Department of Transportation (1997).'SEP-14 Proposal for CDOT Project No. IM-IR(CX) 025-3(113)'. Colorado Department of Transportation

Songer, Anthony D. (1992).'Toward an Improved Understanding of Public Sector Design-Build'. University of California at Berkeley

* .'Understanding the Risks'.

Utah Department of Transportation (1997).'Utah Takes New Contracting Route Presentation'. Utah Department of Transportation

Washington State DOT (2002).'Washington State DOT Design-Build Website'.

Periodicals

Friedlander, Mark C. (1994).'A Primer on Industrial Design Build Construction Contracts'. The Construction Lawyer 14(2)

Pocock, Jim; Liu, Laing (1996).'Alternative Approaches to Projects: Better or Worse?'. The Military Engineer(578)

Wright, Gordon (1995).'Amid controversy, Design Build Survives'. Building Design and Construction 36(1)

Lunch, Milton F. (1992).'ASCE Report Addresses Design/Build Benefits and Concerns'. Building Design and Construction 33(7)

Powers, Mary Buckner (2001).'At the Crossroads: Forecast Hinges on Procurement Policies'. Design-Build, McGraw-Hill

* (1993).'California Completes Its First Public/Private, Design/Build Project'. Building Design and Construction 34(10)

Smith, Nancy C. (1994).'Changing Relations Between Owners and Contractors: Risk Allocation in Design/Build Contracts'. 1994(Oct.)

Fish, John G. (1991).'Cost Control in Design/Build'. Cost Engineering 33(10)

Smith, Douglas G. (1994).'Delivering Public Works Projects--Different Approaches'. Public Works 1994(Mar.)

Hodgson, G. J. (1995).'Design and Build--Effects of Contractor Design on Highway Schemes'. Proceedings of the Institute of Civil Engineers--Civil Engineering, Institute of Civil Engineers 108(2)

Napthine, R.; Smart, R. (1995).'Design and Build--Lessons from the UK Channel Tunnel Terminal'.

Proceedings of the Institute of Civil Engineers, Civil Engineering 108(3)

* (1991).'Design-Build at GSA'. Constructor 73(9)

Edmunds, Jane (1992).'Design-Build Gaining Ground'. Engineering News Record 228(5)

McManamy, Rob (1994).'Design-Build Goes Back to the Future'. Engineering News Record 233(1)

Denning, James (1992).'Design-Build Goes Public'. Civil Engineering 62(7)

Mielke, William (1993).'Design-Build Threatens A/E Position in Public Sector'. American Consulting Engineer 4(3)

Farrell, Byron, F. (1993).'Design-Build...An AGC Perspective'. American Consulting Engineer 4(3)

Journal of Management Engineering (1995).'Design/Build Blossoms'. 11(3)

Klemens, Thomas, L. (1990).'Design/Build Contracting Speeds Bridge Completion'. Highway & Heavy Construction 133(13), 20

* (1990).'Design/Build Contracting Speeds Bridge Job'. Highway and Heavy Construction 133(13)

* (1993).'Design/Build Contracts Spreading in Industry'. Engineering News Record 1993(Sept)

Halsey, Casey S.; Quatman, William (1989).'Design/Build Contracts: Valid or Invalid?'. The Construction Lawyer 9(3)

Lunch, Milton F. (1994).'Design/Build Gets Boost From the Corps of Engineers'. Building Design and Construction 35(5)

* (1994).'For Design-Build, It's All in their Perception'. Civil Engineering 64(June), 11-12

Courtillet, Jacques R. (1992).'Have You Considered Design/Build?'. Nave Civil Engineer 30(3)

Lunch, Milton F. (1994).'Legislation Seeks Two Phase Design/Build for Federal Agencies'. Building Design and Construction 35(9)

* (1994).'Light Rail Project Goes 'Super-Turnkey''. Engineering News Record 233(18)

Post, Nadine M. (1994).'Making a Federal Case for Design Build at Two-Tower Project'. Engineering News Record 232(11)

Daniels, Stephen H. (2001).'New Washington State DOT Head Pushing Design-Build to Ease Congestion'. construction.com, McGraw-Hill

* (1995).'New York Begins First Design Bridges'. Civil Engineering 65(1)

Briggs, James M. (1993).'Newport Design/Build: A Winner for the Government and the Contractor'. Navy Civil Engineer 32(1)

* (1995).'NSPE Adopts Position on Design/Build'. Building Design and Construction 36(6)

* (1994).'NYC Takes a New Approach'. Engineering News Record 1994(Sept)

* (1994).'Off the Shelf'. Building Supplement 210(9), 27

Abramowitz, Ava J. (1995).'Professional Liability in the Design/Build Setting'. The Construction Lawyer 15(3)

Ichniowski, Tom (1995).'Reform Advances on Procurement'. Engineering News Record 235(6)

Poe, William (2001).'Regional leaders seek ways to "fast-track" Highway 40 reconstruction'. St. Louis Commerce Magazine, St. Louis Regional Chamber & Growth Association (RCGA), 3

Nicholson, Joseph (1991).'Rethinking the Competitive Bid'. Civil Engineering 61(1)

Schriener, Judy (2001).'Rocky Mountain High . . . Way'. construction.com, McGraw-Hill

* (1990).'State Launches Design/Build for Public Projects'. Highway and Heavy Construction 133(13)

* (1991).'Survey of Public-Sector Construction'. Building Design and Construction 32(13)

Frielander, Mark, C. (1994).'The Limitations on Warranties of Quality in EPC and Design-Build Contracts: The Owner's Perspective'. The Construction Lawyer 14(2)

Ichniowski, Tom (1995).'The Peace Dividend? It's Real,'. Engineering News Record 234(13)

Chiarelli, Linda; Chiarelli, Lawrence (1995).'The Role of the Construction Manager on a Design-Build Project'. The Construction Lawyer 15(2)

Buchanan, B.; Gravallese, M. (1995).'The Small Firm: Expanding to Design/Build'. AIArchitect Octob, 14

Lunch, Milton F. (1994).'Two-Phase Design/Build Procedure for Federal Projects Eliminated from Procurement Law'. Building Design and Construction 35(10)

Ichniowski, Tom (1995).'Washington Observer--GSA Revamps Real Estate Arm'. Engineering News Record 234(10)

How Will the U.S. Finance its Passing Transportation Needs? (1977), 'Civil Engineering', ASCE, 47(11), 72-74.

Reports

Burkett, Zach, III (1998).'1998 Symposium on Innovative Contracting Construction Delivery Construction Contractors Perspective'. Zach Burkett Company, 1-12.

Sanderson, Len (1998).'1998 Symposium on Innovative Contracting Construction Delivery State Highway Agency Perspective'. North Carolina Department of Transportation, 1-7.

McGowan, Joe (1998).'1998 Symposium on Innovative Contracting Expediting the Project Delivery Process Construction Contractor Perspective'. Granite Construction, 1-28.

Foster Beach Delon Hampton & Associates (1998).'1998 Symposium on Innovative Contracting Expediting the Project Delivery Process Consultant Perspective'. American Consulting Engineers Council, 1-14.

Williams, Ron (1998).'1998 Symposium on Innovative Contracting Expediting the Project Delivery Process State Highway Agency Perspective'. Arizona Department of Transportation, 1-28.

Edwards, Mark (1998).'1998 Symposium on Innovative Contracting Highway Users' Perspective of Innovative Contracting Quality in Highway Construction'. AAA, 1-4.

Lucas, Don (1998).'1998 Symposium on Innovative Contracting Perspectives of the Past and Future of Innovative Contracting AASHTO Perspective'. Indiana Department of Transportation, 1-12.

Waltze, Jim (1998).'1998 Symposium on Innovative contracting Perspectives of the Past and Future of Innovative Contracting Construction Contractor Perspective'. Griffith Construction, 1-14.

Rentz, Henry (1998).'1998 Symposium on Innovative Contracting Perspectives of the Past and Future of Innovative Contracting FHWA Perspective'. FHWA Headquarters, 1-26.

Xanders, Greg (1998).'1998 Symposium on Innovative Contracting Perspectives of the Past and Future of Innovative Contracting State Highway Agency Perspective'. Florida Department of Transportation, 1-12.

Sibert, Bill (1998).'1998 Symposium on Innovative Contracting Quality Drivers Construction Contractor Perspective'. Moore Brothers Construction, 1-8.

Wittwer, Dave (1998).'1998 Symposium on Innovative Contracting Quality Drivers Non-Warranty Quality'. Wittwer Construction, 1-5.

Whited, Gary (1998).'1998 Symposium on Innovative Contracting Quality Drivers State Highway Agency Perspective'. Wisconsin Department of Transportation, 1-4.

Ashmore, Richard (1998).'1998 Symposium on Innovative Contracting Shared Responsibility Contractor Perspective'. Ashmore Brothers Inc, 1-6.

Cook, Lynne (1998).'1998 Symposium on Innovative Contracting Shared Responsibility Insurance Industry Perspective'. Surety Association of America, 1-7.

Lynwood, Phil (1998).'1998 Symposium on Innovative Contracting Shared Responsibility State Highway Perspective'. Michigan Department of Transportation, 1-27.

Chapple, Anna, M. (1998).'1998 Symposium on Innovative Contracting Summary of Discussion Sessions'. Technautics Inc, 1-4.

Warne, Tom (1998).'1998 Symposium on Innovative Contracting Summary/Closing'. Utah Department of Transportation, 1-9.

Konchar, Mark D. (1997).'A Comparison of United States Project Delivery Systems'. Pennsylvania State University, 1-167. Pennsylvania

Gurry, William W.; Smith, Robert J. (1995).'Allocation of Risk in Design/Build Projects--The EJCDC Approach'. ASCE, 355-362. New York

Gurry, William W. (1995).'Allocation of Risk in Design/Build Projects-The EJCDC Approach'. Construction Congress: Proceedings of the 1995 Conference. San Diego, California

Utah Technology Transfer Center .'Best Practices Guide for Innovative Contracting Procedures'. Utah State University. Logan, UT

Hawaii Department of Transportation .'Briefing Hawaii's Design-Build Project'. Hawaii Department of Transportation, 1-7.

Federal Highway Administration (2000).'Briefing on FHWA Innovative Contracting Practices'. Federal Highway Administration, 1-2.

Federal Highway Administration (1997).'California Alameda Corridor Design-Build Concept Review Comments'. Federal Highway Administration, 1-4.

Colorado Department of Transportation (*).'Colorado Project No. Ir(CX) 070-3(143) Work Plan'. Colorado Department of Transportation, 1-60. Colorado

Arizona Department of Transportation (2001).'Context-Sensitive Design Case Study No. 13- State Route 68-Arizona'. Arizona Department of Transportation, 1-7.

AASHTO Subcommittee on Construction (1996).'Contracting 2000 Whitepaper'. AASHTO, 1-4.

Pennsylvania Department of Transportation (2001).'Design Build Beaver County Pennsylvania'. Pennsylvania Department of Transportation, 1-1.

Simas, Francisco O. (1998).'Design Build Contracting in the Oregon Department of Transportation'. Oregon State University, 1-60. Oregon

General Services Administration (1993).'Design-Build Delivery Assessment'. U.S. General Services Administration Public Building Services.

Ernzen, James J.; Schexnayder, Cliff; Flora, Gwen .'Design-Build Effects on a Construction Company; A Case Study'. Del E. Webb School of Construction, Arizona State University. Tempe, AZ

Jennifer Shane (2003).'Design-Build Highway Construction: An Examination of Special Experimental Project Number 14 Performance'. University of Colorado, 1-161. Boulder, Colorado

American Society of Civil Engineers (1992).'Design-Build in the Federal Sector, A Report to the Task Committee on Design Build'. American Society of Civil Engineers. Washington, D.C.

Army Corps of Engineers (1994).'Design-Build Instructions (DBI) for Military Construction'. U.S. Army Corps of Engineers. Washington, D.C.

Parsons Brinckerhoff Quade & Douglas Inc (2002).'Design-Build Practice Report'. New York State Department of Transportation, 1-106. New York

Buckland, Peter G. (1995).'Design/Build as a Form of Contract for Bridges'. Buckland and Taylor, Ltd.. North Vancouver, BC

Goldenhersh, Lawrence E.; Elder, Charles E. (1995).'Design/Build Contracting: Removing the Constitutional Roadblock for CALTRANS'. DBIA Annual Conference, San Francisco, California.

National Society of Professional Engineers (1995).'Design/Build in the Public Sector'. NSPE.

Federal Highway Administration .'Design/Build Project, Blackwater River Bridges (I-10) in Santa Rosa County, Florida'. Federal Highway Administration, 1-12.

Kumar, B. K.; Fielland, Carl E.; Boyle, Tom (1995).'Design/Build Success: Tampa Port Authority Berth 208'. Ports 95, Proceedings of the Conference. Tampa, Florida

Department of Transportation (1994).'Design/Build: A New Approach'. U.S. Department of Transportation-Federal Transit Administration. Washington, D.C.

Department of Transportation (1993).'Design/Build: A New Approach-Turnkey Demonstration Program Implementation Strategy'. U.S. Department of Transportation-Federal Transit Administration.

Bennett, John; Pothecary, Ellen; Robinson, Graham (1996).'Designing and Building a World-Class Industry'. Centre for Strategic Studies in Construction, 1-91.

Morian, Dennis A.; Stoffels, Shelley; Senn, Kevin .'Designing Pavement for Design-Build with End Result Specifications'. , 1-29.

Utah Department of Transportation (1996).'Draft Proposal for Special Experimental Project 14 Design/Build Contracting I-15 Corridor in S.L. County'. Utah Department of Transportation, 1-8. Utah

Shane, Jennifer, S. (2002).'Effect of Design-Build on Small Highway Contractors'. , 1-15. Colorado

Eppenhimer, Ralph J.; Marianos, Ward N.; Martin, Barney T. (1991).'Emergency Reconstruction of Bascule Bridge on Design-Build Basis'. . Pittsburgh, Pennsylvania

Federal Construction Council (1993).'Experiences of Federal Agencies with the Design-Build Approach to Construction'. Federal Construction Council.

Federal Highway Administration (1996).'FHWA Initiatives to Encourage Quality Through Innovative Contracting Practices'. Federal Highway Administration, 1-17.

Myers, James J. (1994).'Final Report on Design/Build as an Alternative Construction Delivery Method for Public Owners'. Building Futures Council Management and contracting Alternatives Committee.

Florida Department of Transportation (2003).'Florida Department of Transportation'. Florida Department of Transportation, 1-16. FL

Smith, Nancy C. .'Impact of Licensing Rules on Legal Structure of D-B Contractors: Doing the Right Thing'. Nossaman, Guthner, Knox & Elliott, 1-29.

Noble, Dena D.; Russell, Jeffrey S.; Anderson, Stuart D.; Hanna, Awad, S.; Smith, Robert J. .'Innovative Contracting Methods for Highway Construction Projects'. American Association of State Highway and Transportation Officials, 1-16.

Indiana Department of Transportation .'Innovative Contracting Practices Design-Build Work Plan'. Indiana Department of Transportation, 1-7.

Hauser, Edd; Stock, K. T. (1993).'Innovative Contracting Practices in Developing an Advanced Freeway Management System'. Pacific Rim Trans Tech Conference. Seattle, Washington

Tomeh, Osama A.; Schneck, Donald C.; Stross, R. Andrew (1999).'Innovative Procurement Methods in Rail Transit Projects: The Baltimore Turnkey Experience'. Booz, Allen & Hamilton Inc., 1-16. McLean, VA

Pekka Pakkala (2002).'Innovative Project Delivery Methods for Infrastructure: An International Perspective'. Finnish Road Enterprise, 1-122. Helsinki

Michigan Department of Transportation (1994).'IVHS-ATMS/ATIS Deployment Project Work Plan for SEP 14'. Michigan Department of Transportation, 1-14. Michigan

McGough, Tim (1996).'New Jersey Department of Transportation Design-Build Program (Project Delivery & Procurement Methodology) Work Plan'. New Jersey Department of Transportation, 1-15.

Naval Facilities Engineering Command (1994).'Newport Design/Build (D/B)'. Naval Facilities Engineering

Command.

Spaulding, Vincent M. (1988).'Newport Design/Build--A Study on Integrating the Newport Design/Build Strategy into the NAVFACENGCOM Facilities Design and Acquisition Process'. Naval Facilities Engineering Command.

Napier, Thomas R.; Freiburg, Steven R. (1990).'One-Step and Two-Step Facility Acquisition for Military Construction: Project Selection and Implementation Procedures'. U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, Knowledge Base for Alternative Construction Methods.

Songer, Anthony D.; Kappers, Garret (1995).'Organizational Strategy for Implementing Design-Build Delivery Systems'. ASCE, 263-370. New York

Weed, Richard M. .'Practical Framework for Performance-Related Specifications'. New Jersey Department of Transportation, 1-18.

Napier, Thomas R.; Stumph, Annete L. (1993).'Preparing Technical Requirements for Third Party Contracting of Army Facilities'. U.S. Army Corps of Engineers, Construction Engineering Research Laboratory.

Walewski, John; Gibson, G. Edward, Jr.; Jasper, Jason (2001).'Project Delivery Methods and Contracting Approaches Available for Implementation by the Texas Department of Transportation Aug 2000-Oct 2001'. Texas Department of Transportation, 1-116. Austin, Texas

The Construction Industry Institute (1997).'Project Delivery Systems: CM at Risk, Design-Build, Design-Bid-Build'. The Construction Industry Institute, 1-44.

Federal Highway Administration .'Rebuilding America: Partnership for Investment-Innovative Contracting Practices'. Federal Highway Administration, 1-20. Washington, D.C.

General Services Administration (1995).'Report on Design-Build Round Table'. National Institute of Building Sciences.

Building Futures Council (1995).'Report on Design/Build as and Alternative Construction Delivery Method for Public Owners'. Building Futures Council. Georgetown, Maryland

HDR and Minnesota Department of Transportation (2003).'ROC52 Design-Build Project Lessons Learned: Report 1-Procurement Phase'. Minnesota Department of Transportation, 1-45. Minnesota

National Research Council (1992).'Role of Public Agencies in Fostering New Technology and Innovation in Building'. National Research Council, Building Research Board.

Sanvido, Victor; Konchar, Mark (1999).'Selection Project Delivery Systems: Comparing Design-Build, Design-Bid-Build and Construction Management at Risk'. The Project Delivery Institute, 1-77. State College, PA

Napier, T. P.; Holcomb, T. D.; Kapolnek, R. G.; Rivas, A. (1988).'Six Case Studies on Alternative Construction Methods: One-Step 'Turnkey' Facility Acquisition and Architectural Fabric Structure Technology'. U.S. Army Corps of Engineers, Construction Engineering Research Laboratory.

The Design-Build Institute of America (2002).'Survey of State Procurement Laws Affecting Design-Build'. The Design-Build Institute of America, 1-60. Washington, DC

Gransberg, Douglas D. (1999).'The Cost of Inaction: Does Massachusetts Need Public Construction Reform?'. Pioneer Institute for Public Research, 1-29. Boston, Massachusetts

Federal Construction Council (1988).'The Design-Build Approach to Acquiring Facilities'. Federal Construction

Council.

Gowings, Dennis C. (1991).'The Engineer's Role in Design/Build'. . Pennsylvania

Murthy, K. N. (1995).'The Los Angeles Heavy Rail System: Innovative Solutions to Design and Construction Challenges'. Construction Congress: Proceedings of the 1995 Conference. San Diego, California

Goodman, B.; Peck, C.; Schwartz, R. (1988).'Turnkey Park and Ride Facility Investigation'. Goodman Corp. for the Urban Mass Transportation Administration. Washington, D.C

Knsace, Rocque L. (1995).'Use of Design-Build Contracts for the Replacement of Bridges Destroyed in Tropical Storm Jerry Work Plan'. South Carolina Department of Transportation, 1-5. South Carolina

Johnson, Ann M. (1999).'Use of Design/Build and Warranties in Highway Construction'. Minnesota Local Road Research Board, 1-48. Minnesota

Federal Highway Administration (1995).'Use of the Design/Build Concept on Federal-Aid Projects'. Transportation Research Board.

Michigan Department of Transportation .'Work Plan for Special Experimental Project 14 Design-Build-Warranty Contracting US-23 Washtenaw County'. Michigan Department of Transportation, 1-26. Michigan

Loulakis, M.C. (1999). Construction Project Delivery Systems: Evaluating the Owners Alternatives, AEC Training Technologies.

Tenah, K.A. (2001). Project Delivery Systems for Construction: An Overview, Cost Engineering, AACE International, Morgantown, WV, 43(1), 30-36.

RFP/RFQ

City of Phoenix Arizona Water Services Department (2001).'City of Phoenix, Arizona Water Services Department Request for Proposals Volume 1 of 2 Lake Pleasant Water Treatment Plant Design-Build-Operate Proj.'. City of Phoenix Arizona Water Services Department

City of Phoenix Arizona Water Services Department (2000).'City of Phoenix, Arizona Water Services Department Request for Qualifications Lake Pleasant Water Treatment Plant Design-Build-Operate Project'. City of Phoenix Arizona Water Services Department

Virginia Department of Transportation (2002).'Demolition and Construction of a Safety Rest Information Center on Eastbound I-64 in New Kent County, Virginia'. Virginia Department of Transportation

East Bay Municipal Utility District and Sacramento County Water Agency (2001).'Freeport Regional Diversion Project'. East Bay Municipal Utility District and Sacramento County Water Agency

Georgia Department of Transportation (2000).'Georgia DOT Announces Design/Build Project'. Georgia Department of Transportation

Utah Department of Transportation (*).'Lake Bonneville Contractors Evaluation Debriefing'. Utah Department of Transportation

Los Alamos National Laboratory (2002).'Los Alamos National Laboratory Part B. Statement of Qualifications'. Los Alamos National Laboratory

Los Alamos National Laboratory (2002).'Los Alamos National Laboratory Part C Design-Build Scope and Program Document'. Los Alamos National Laboratory

Los Alamos National Laboratory (2002).'Los Alamos National Laboratory RFQ Cover Letter'. Los Alamos National Laboratory

Minnesota Department of Transportation (2001).'Minnesota Department of Transportation T.H. 100 Duluth Street Design-Build Project'. Minnesota Department of Transportation

Minnesota Department of Transportation (2001).'Minnesota Department of Transportation T.H. 100 Duluth Street Part II Instructions to Proposers'. Minnesota Department of Transportation

Minnesota Department of Transportation (2001).'Minnesota Department of Transportation T.H. Duluth Street Part I Scope of Work'. Minnesota Department of Transportation

The Pentagon Renovation Office (1999).'Pentagon Renovation Program Request for Qualifications for the Design/Build of the Metro Entrance Facility (MEF)'. The Pentagon Renovation Office

City of Reno Nevada (2001).'Request for Preliminary Proposals for Design-Build of the Proposed Reno Transportation Rail Access Corridor'. City of Reno Nevada

Utah Department of Transportation (*).'Salt Lake Constructors Evaluation Debriefing I-15 Corridor Reconstruction Project'. Utah Department of Transportation

Spartan Shops Inc (2000).'San Jose State University Campus Housing and Retail Project'. San Jose State University

Spartan Shops Inc (2000).'San Jose State University Campus Village Housing and Retail Project'. San Jose State University

Spartan Shops (2000).'San Jose State University Campus Village Housing and Retail Project Addendum #1'. San Jose State University

City of Santa Monica (2002).'Santa Monica Big Blue Bus Campus Expansion'. City of Santa Monica

Seattle (2000).'Seattle Central Library RFQ Evaluation Criteria'. Seattle

* .'Statement of Qualifications Office Building A & B'.

Seattle Water Department (1996).'Tolt DBO Request for Qualifications'. Seattle Water Department

New Mexico State Highway and Transportation Department (2001).'US 70 Hondo Valley Ruidoso Downs to Riverside Design and Build Project'. New Mexico State Highway and Transportation Department

SEP Evaluations

Tymvios, N. M.; McCullouch, B. G.; Sinha, K. C. (2002).'An Initial Evaluation of Design-Build Highway Projects Performed by the Indiana Department of Transportation'. Indiana Department of Transportation,1-128. Indianapolis, IN

Arizona Department of Transportation (1998).'Arizona's New Design-Build Law and Experience to Date '. Arizona Department of Transportation,1-28. Arizona

The HNTB Companies (1997).'CARAT--An Operational Test of Design-Build-Warrant Procurement for Its Deployment, Evaluation Report of Phase 1 Procurement, Chapter 1'. North Carolina Department of Transportation,1-12.

The HNTB Companies (1997).'CARAT--An Operational Test of Design-Build-Warrant Procurement for Its Deployment, Evaluation Report of Phase 1 Procurement, Chapter 2'. North Carolina Department of

Transportation,1-7.

The HNTB Companies (1997).'CARAT--An Operational Test of Design-Build-Warrant Procurement for Its Deployment, Evaluation Report of Phase 1 Procurement, Chapter 4'. North Carolina Department of Transportation,1-7.

Ernzen, Jim; Woods, Janet .'Contractor-Led Public Relations on a Design-Build Highway Project'. ,1-30. Arizona

Molenaar, K. R. (2003).'Design-Build Pilot Project Evaluation: A Measurement for the Process, Time, Cost, and Quality'. Washington State Department of Transportation,1-76. Olympia, WA

Van Note, Bruce, A. (1998).'Design-Build-Warranty in Maine The Bath-Woolwich Bridge Project Mid Year 1998 Report'. Maine Department of Transportation,1-26. Portland, Maine

Weiss, Lawrence, L. (2001).'Design/Build Final Report: Design/Build-Additional Lessons Learned to Date'. South Dakota Department of Transportation,1-6. South Dakota

Weiss, Lawrence, L. (2001).'Design/Build-Interim Report and Additional Lessons Learned'. South Dakota Department of Transportation,1-3. South Dakota

Weiss, Lawrence, L. (2000).'Design/Build-Lessons Learned to Date (Design/Build Initial Report)'. South Dakota Department of Transportation,1-7. South Dakota

Ernzen, Jim; Vogelsang, Ken .'Evaluating Design-Build Procurement Documents for Highway Projects; How Good are They?'. ,1-28. Arizona

Ardani, Ahmad; Guevara, Bernnie; Scheuerman, William (1997).'Evaluation of Design Build Practice in Colorado IR(CX)70-4(143)'. Colorado Department of Transportation,1-16. Denver, Colorado

Colorado Department of Transportation (1999).'Evaluation of Design Build Practices in Colorado IR(CX)70-4(143)'. Colorado Department of Transportation,1-23. Colorado

Graham, Pete (2001).'Evaluation of Design-Build Practice in Colorado Project IR IM(CX) 025-3(113)'. Colorado Department of Transportation Research Branch,1-35. Colorado

Ellis, Ralph; Herbsman, Zohar; and Kumar, Ashish (1991).'Evaluation of the FDOT Design Build Program'. University of Florida College of Engineering Dept. of Civil Engineering. Gainesville, Fla.

Ellis, Ralph D.; Kumar, Ashish (1992).'Final Evaluation of the Florida Department of Transportation's Pilot Design/Build Program'. . Washington, D.C.

Utah Department of Transportation (1998).'I-15 Corridor Reconstruction Project 1998 Annual Report'. Utah Department of Transportation,1-50. Utah

Carter & Burgess, Inc. (2000).'I-15 Corridor Reconstruction Project Design/Build Evaluation 1999 Annual Report'. ,1-41.

Carter & Burgess, Inc. (2001).'I-15 Corridor Reconstruction Project Design/Build Evaluation 2000 Annual Report'. ,1-46. Utah

Utah Department of Transportation (1997).'I-15 Corridor Reconstruction Project Initial Report'. Utah Department of Transportation,1-198. Utah

South Carolina Department of Transportation (1997).'Initial Report for SEP (Special Experimental Project) 14 Design-Build Contract for the Replacement of US 601 Southbound Bridge Over the Wateree River'. South

Carolina Department of Transportation,1-7. South Carolina

Pennsylvania Department of Transportation (2000).'Initial/Interim Report on Design/Build'. Pennsylvania Department of Transportation,1-6.

Pennsylvania Department of Transportation (1999).'Initial/Interim/Final Report Modified Turnkey (Design/Build) Susquehanna County'. Pennsylvania Department of Transportation,1-5.

Ohio Department of Transportation (1999).'Interim Report ODOT Experience on Six Pilot Design-Build Projects'. Ohio Department of Transportation,1-10. Ohio

Transportation Expansion Project (2002).'Interstate 25 and 225 Transportation Expansion Project T-REX Design/Build Contracting SEP 14 Initial Report'. Transportation Expansion Project,1-65. Denver, Colorado

Phips, Alan R. (1999).'Maine Develops Unique Design-Build Selection Process for Bath-Woolwich Bridge'. Figg Engineers, Inc. and Transportation Research Board,1-16. Denver, CO

Michigan Department of Transportation (2003).'Michigan Department of Transportation Design-Build Contracting'. Michigan Department of Transportation,1-9. Michigan

New Jersey Department of Transportation (1996).'New Jersey's Modified Design-Build Program Initial Progress Report'. New Jersey Department of Transportation,1-19.

New Jersey Department of Transportation (1998).'New Jersey's Modified Design-Build Program- Part I Progress Report #4'. New Jersey Department of Transportation,1-21. New Jersey

New Jersey Department of Transportation (1999).'New Jersey's Modified Design/Build Program Progress Report #6'. New Jersey Department of Transportation,1-33. New Jersey

Parsons Brinckerhoff Quade & Douglas Inc. (2002).'New York State Department of Transportation Design-Build Practice Report'. New York State Department of Transportation,1-67. New York

Parsons Brinckerhoff Quade & Douglas Inc. (2002).'New York State Department of Transportation Design-Build Practice Report Appendix 7 Completed Surveys'. New York State Department of Transportation,1-188. New York

New Mexico State Highway and Transportation Department (2003).'NM 528 Widening Project Number TPU-4020-(7)05 SEP-14 Initial Report'. New Mexico State Highway and Transportation Department,1-20. New Mexico

Rogge, David F.; Pinto, Rodolfo; Gobble, Darrell (2001).'ODOT Design-Build Pilot Projects Evaluation For Evans Creek-Rock Point Design-Build Pilot Project'. Oregon State University and Oregon Department of Transportation,1-42. Oregon

Rogge, David F. (2001).'ODOT Design-Build Pilot Projects Evaluation, Volume I'. Oregon State University and Oregon Department of Transportation,1-11. Oregon

Rogge, David F.; Pinto, Rodolfo; Gobble, Darrell (2001).'ODOT Design-Build Pilot Projects Evaluation, Volume II Special Experimental Project Evaluation'. Oregon State University and Oregon Department of Transportation,1-42. Oregon

Rogge, David F.; Pinto, Rodolfo (2001).'ODOT Design-Build Pilot Projects Evaluation, Volume III'. Oregon State University and Oregon Department of Transportation,1-45.

Van Note, Bruce A. (1998).'Practical Considerations for Design-Build The Bath-Woolwich, Maine Design-Build-Warranty Bridge Project'. Maine Department of Transportation,1-69.

Varela, Steve; Sparnicht, John (2002).'Recommendation to Council to Award the Design-Build Contract for ReTRAC Construction'. ,1-17.

New Mexico State Highway and Transportation Department (2002).'US 70 Hondo Valley Ruidoso Downs to Riverside Project Number AC-MIP-070-4(35)264 SEP-14 Initial Report'. New Mexico State Highway and Transportation Department,1-16. New Mexico

Molenaar, Keith and Ellis, Ralph (2001).'Washington State Department of Transportation Design-Build Pilot Project Evaluation: Interim Report--POQ/BAFP Evaluation'. Washington State Department of Transportation. Olympia, WA

Molenaar, Keith; Coggins, Steven; Ellis, Ralph (2002).'Washington State Department of Transportation Design-Build Pilot Project Evaluation: Interim Report-Contract Administration'. Washington State Department of Transportation,1-21. Washington

Molenaar, Keith; Ellis, Ralph (2001).'Washington State Department of Transportation Design-Build Pilot Project Evaluation: Interim Report-POQ/BAFP Evaluation'. Washington State Department of Transportation,1-41. Washington

Molenaar, Keith; Sencer, Justin; Parker, Jamal; Stewart, Travis; Saller, Brian; Coggins, Steve; Butler, Colleen (2003).'Washington State DOT Design-Build Pilot Project Evaluation: A Measurement of Performance for The Process, Cost, Time, and Quality'. University of Colorado and WSDOT,1-78. Washington

State of Alaska Department of Transportation and Public Facilities (2003).'Whittier Access Project Tunnel Segment Design/Build Final Report'. State of Alaska Department of Transportation and Public Facilities,1-31. Alaska